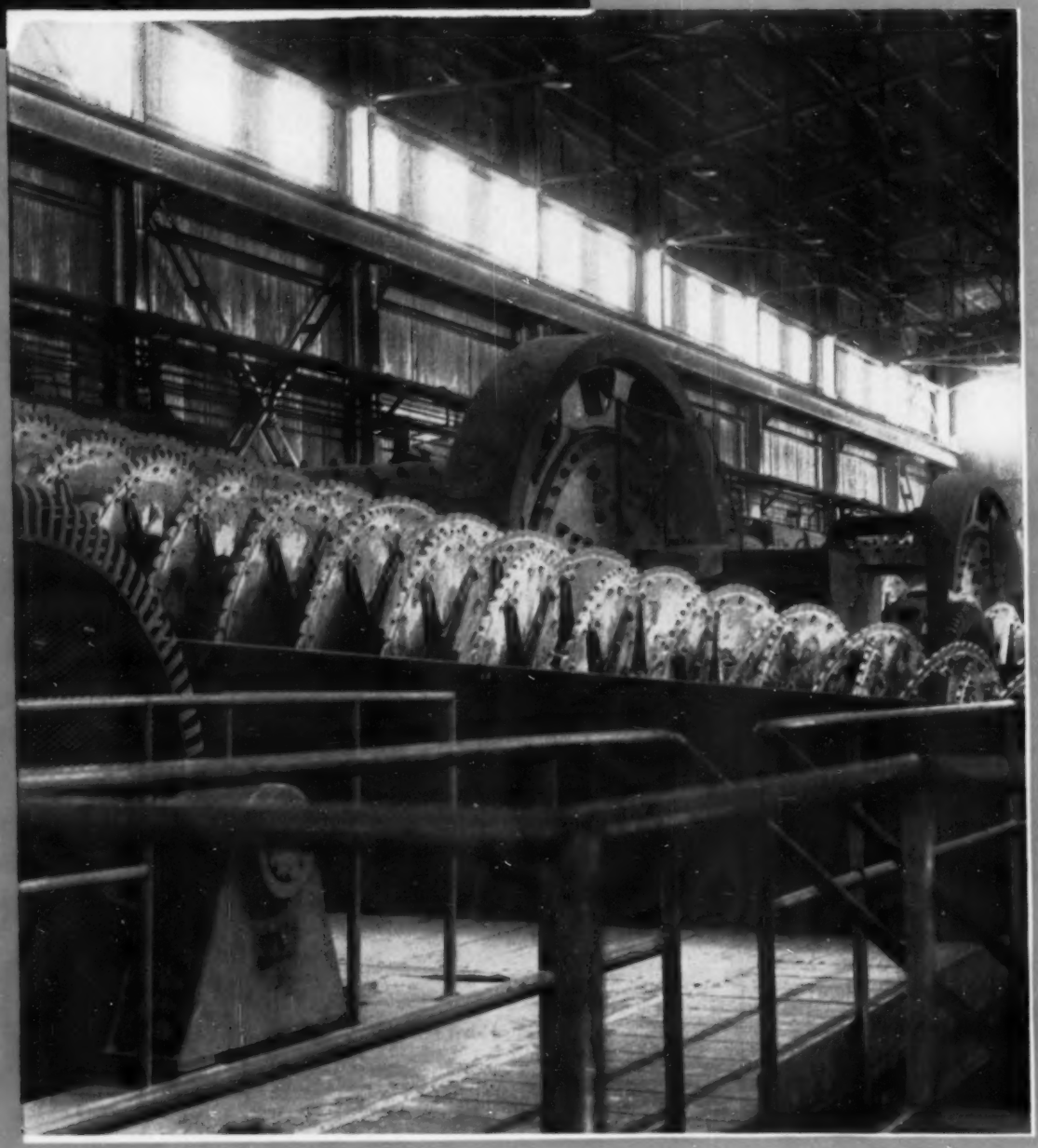
APRIL 1956 Vol. 18 No. 4

MINING WORLD

How Helca Sunk Radon Uranium Shaft

Court of Appeals Rules for Gold Miners



Silver Bell Mill Proves Planning Pays

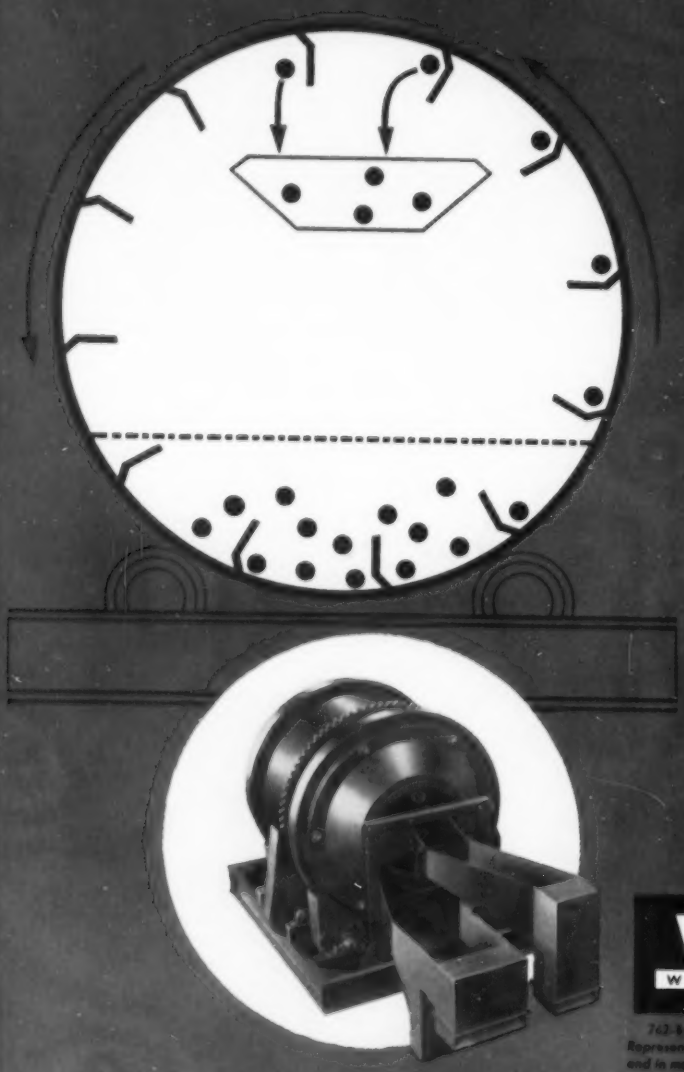
Page 40

50 cents a copy—3s 6d in sterling

see for yourself

WHY THE WEMCO HMS DRUM DOESN'T WEAR OUT

Operators have observed that a Wemco HMS Drum Separator has a long long life.



The difference between this separator and others (that wear in a hurry) is that the entire Wemco Drum rotates as a unit. There are no moving parts inside — no chains, sprockets, screens, scrapers or sweeps to wear due to the extremely abrasive action of rock and medium. The lifters are a built-in part. In them the sink material stays in place until it drops out at top center. And even if the drum is shut-down fully loaded, there are no jamming or abrasion problems on start-up.

The common sense in this drum design is another example of Wemco's sound solution to mining industry problems. This Drum has become the most widely used of all HMS separatory vessels. It has helped, too, to make Wemco's HMS Mobil-Mill the world's most popular Heavy Media plant. Over 50% of all HMS plants use Wemco equipment. Write today and let us send you all the facts.

WEMCO®
WESTERN MACHINERY COMPANY

743-8 FOLSOM STREET • SAN FRANCISCO 7, CALIF.
Representatives in principal cities of the United States and Canada and in major countries throughout the world.

STAYS ON THE JOB LONGER

Rugged body and frame withstand the impacts of loading, hauling and dumping heavy excavation in construction, mine and quarry service.

SPEED AND STABILITY

The 5-speed transmission and Euclid planetary axle provide top speeds with full payload up to 27 m.p.h. Free-floating Euclid spring suspension gives maximum stability empty or loaded under all road conditions . . . permits faster safe travel speeds.

18-ton payload with 16.00 x 25 tires

Outstanding

FEATURES

- **30,000 lb. payload with 14.00 x 24 tires**
- **10½ yd. body**
- **218 h.p.**
- **hydraulic booster steering**
- **air assist clutch**

Here's the New R-15 "Euc"

that sets a new high in 15-ton Rear-Dump Performance!

For over 20 years 15-ton Rear-Dump "Eucs" have paced the field in mine, quarry and construction work. They've delivered "plus" performance year in and year out on hundreds of the toughest jobs.

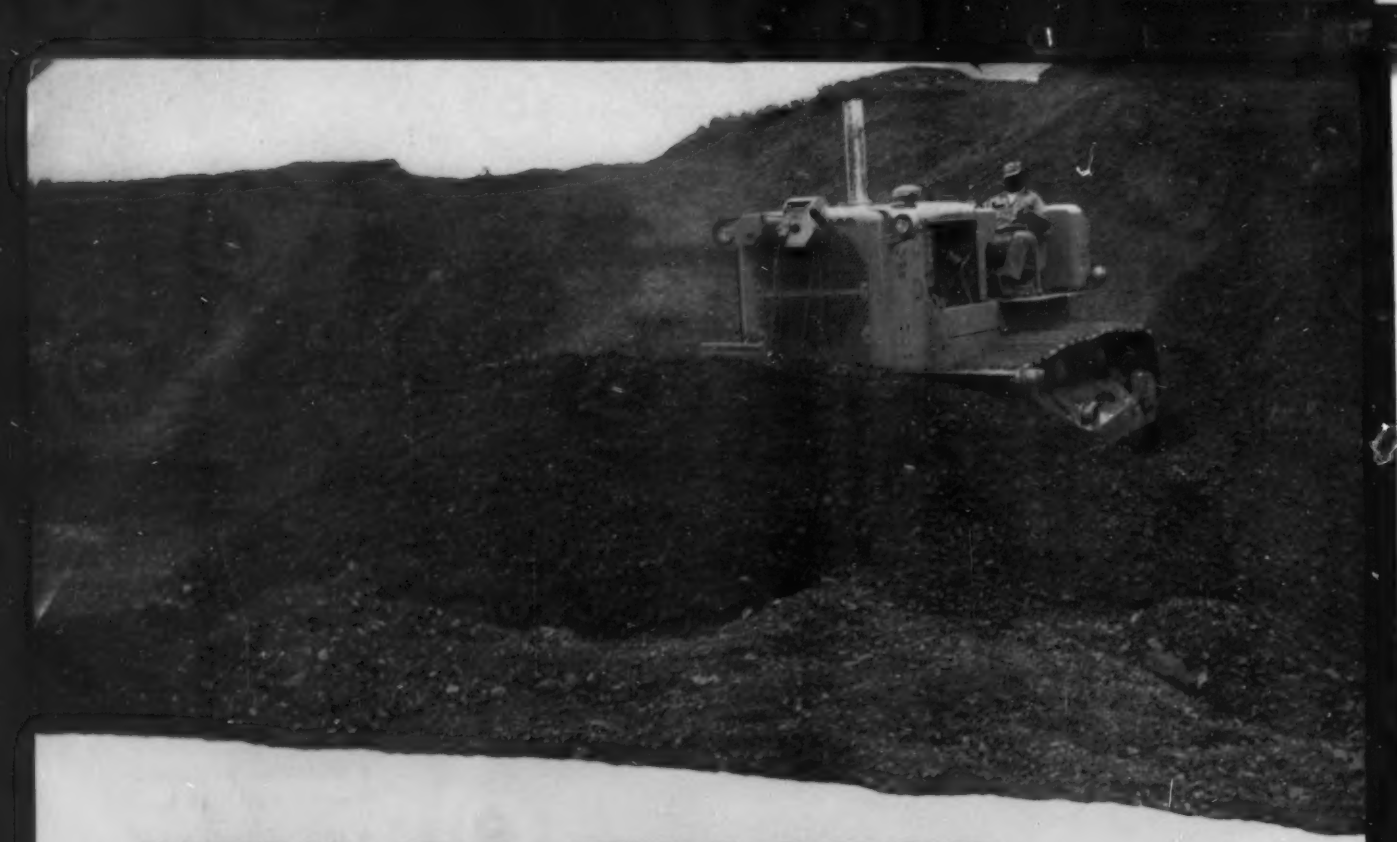
This Model R-15 incorporates the engineering advances, easy operation and maintenance features resulting from unequalled field experience with other Euclids of the same capacity. Dependable work-ability means more payloads per day at lowest cost per ton or yard moved.

Have your Euclid dealer give you the full details on this new 15-ton Rear-Dump and the complete line of Euclid earth moving equipment. He'll be glad to show you why so many users have proved for themselves that ***Euclids are your best investment.***

EUCLID DIVISION, General Motors, Cleveland 17, Ohio

Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE



NEW D9 TRACTOR

Moves more than 600 cubic yards of shale per hour!

This big new CAT* D9 Tractor 'dozes over 600 yds. per hour over a 100-ft. push. Its No. 9A blade handles 12 to 15 yds., trench-dozing on a 30% favorable grade. Material is shale base course for a haul road at Monsanto Chemical Co.'s Soda Springs, Idaho, phosphate mine.

Like all Cat-built equipment, the new D9s are engineered to do more work with less down time at low cost. Morrison-Knudsen Company, Inc., owns this and other giant Turbocharged 286 HP D9s here, purchased because of previous experience with Caterpillar equipment. The company also has Caterpillar D8 Tractors on this job.

The D9s are working in the phosphate beds of southern Idaho, largest known deposit in the world. The giant yellow "Kings of the Crawlers" strip overburden, which varies from 6 ft. to 10 ft. in depth, and feed ore to the shovel. These great new yellow machines are the product of many thousands of hours' testing on proving grounds and actual construction and mining jobs.

The D9 is tough and traditionally Caterpillar from its completely new, 4-cycle engine with Turbocharger to its "water quench" hardened track shoes. It's available with direct drive or torque converter for speeds to 7.8 MPH. Operators report it fast and easy to handle, with hydraulically boosted steering and brakes, "in-seat" starting, and smooth "live shaft" drive for cable controls.

It all adds up to the "workingest" tractor ever built. See your Caterpillar Dealer for details on the D9 with No. 9A or No. 9S Bulldozer blades. And count on him for fast, skilled service and Caterpillar parts you can trust.

Caterpillar Tractor Co., San Francisco, Cal.; Peoria, Ill., U.S.A.

CATERPILLAR*

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NAME THE DATE... YOUR DEALER WILL DEMONSTRATE

Mining World

Including the Export Edition **WORLD MINING**

Published monthly except in April when publication is semi-monthly

VOLUME 18 **APRIL 1956** No. 4

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COVER: Silver Bell Mill uses four Allis-Chalmers 10.5 by 12 foot grate discharge ball mills in closed circuit with duplex spiral 78-inch Akins classifiers for grinding copper ore.

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SHEAVE BLOCKS

with the Locking Pin that can't be lost!

Only Joy Sheave Blocks have the exclusive non-removable locking pin that—

1 Can't possibly loosen and fall out when locked in place

2 Loosens by non-removable key when sheave must be opened.

3 Hangs by a flanged end of locking key, never is removed completely from the sheave to be lost in the muck pile.

OTHER FEATURES—

- Sealed-for life bearings—keep lubricant in, dirt and water out.
- Quick-opening snatch block construction
- Large throat opening
- Wheel recessed into side plates—prevents binding, reduces wear
- Chrome nickel molybdenum heat-treated sheave wheel
- Available in 6", 8", 10", 12", 14", and 20" sizes with safety hook, swivel hook, eye-bolt, or clevis attachments.

Write for FREE Bulletin 46-8

JOY MFG. CO.

Henry W. Oliver Bldg.
Pittsburgh 22, Pa.

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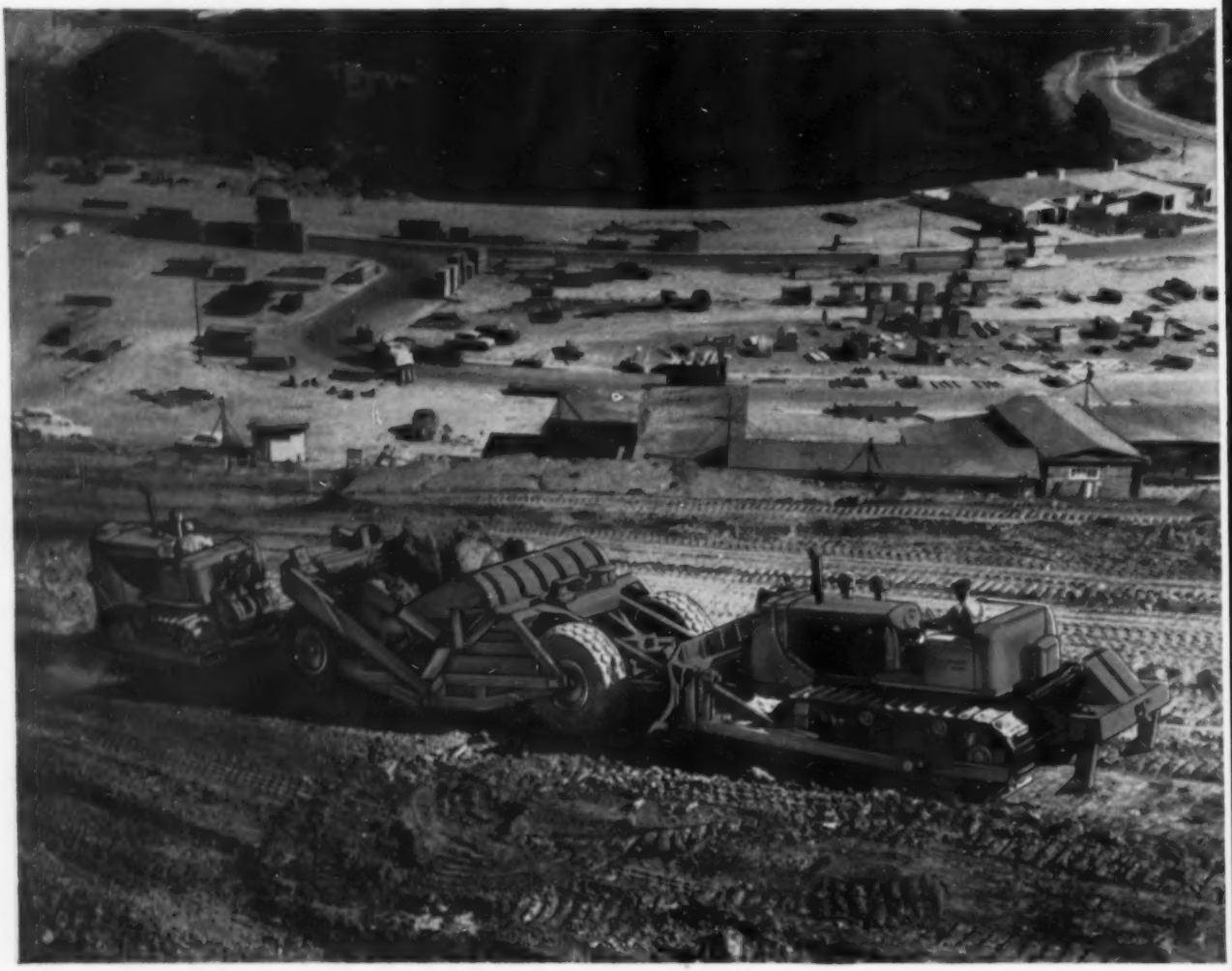


In California, this HD-16 and 315 scraper team—with another Allis-Chalmers torque converter drive tractor as pusher—are part of an Allis-Chalmers fleet moving four and one-half million cu yd on a housing project near San Francisco. With wide, low bowl design and offset cutting edge, scraper gets heaping, void-free loads . . . makes most efficient use of tractor power to cut time and cost per yard. And owner Floyd Watson, Daly City, knows the output advantages of the HD-16 torque converter drive—how it exerts maximum pull at all times to get a full load.

Teamed to increase output ...keep jobs on the move

Allis-Chalmers HD-16 crawler tractor and 315 pull scraper offer a combination of advanced design features that cut cost and time per yard

Here's more of everything you want in a tractor-scraper team to keep producing more on your jobs. Allis-Chalmers HD-16 and 315 give you output with dependability . . . long life with minimum servicing. These profit-making benefits work for you on every job—road building, housing development, land leveling, stripping. Read how these big-volume earth movers can help you cut cost and time per yard . . . then see your Allis-Chalmers dealer for all the facts and a demonstration.

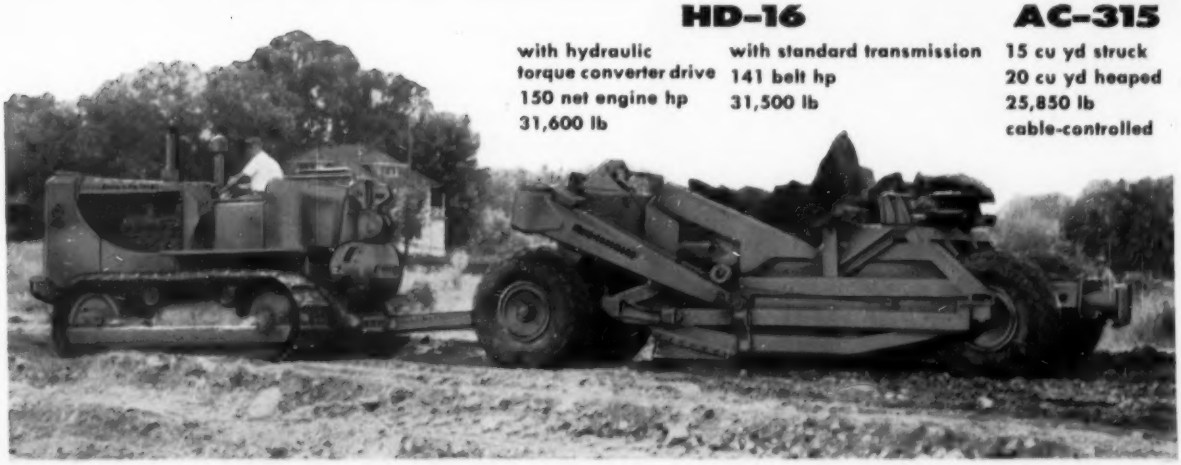
ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION
MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS

HD-16
with hydraulic torque converter drive
150 net engine hp
31,600 lb

with standard transmission
141 belt hp
31,500 lb

AC-315
15 cu yd struck
20 cu yd heaped
25,850 lb
cable-controlled



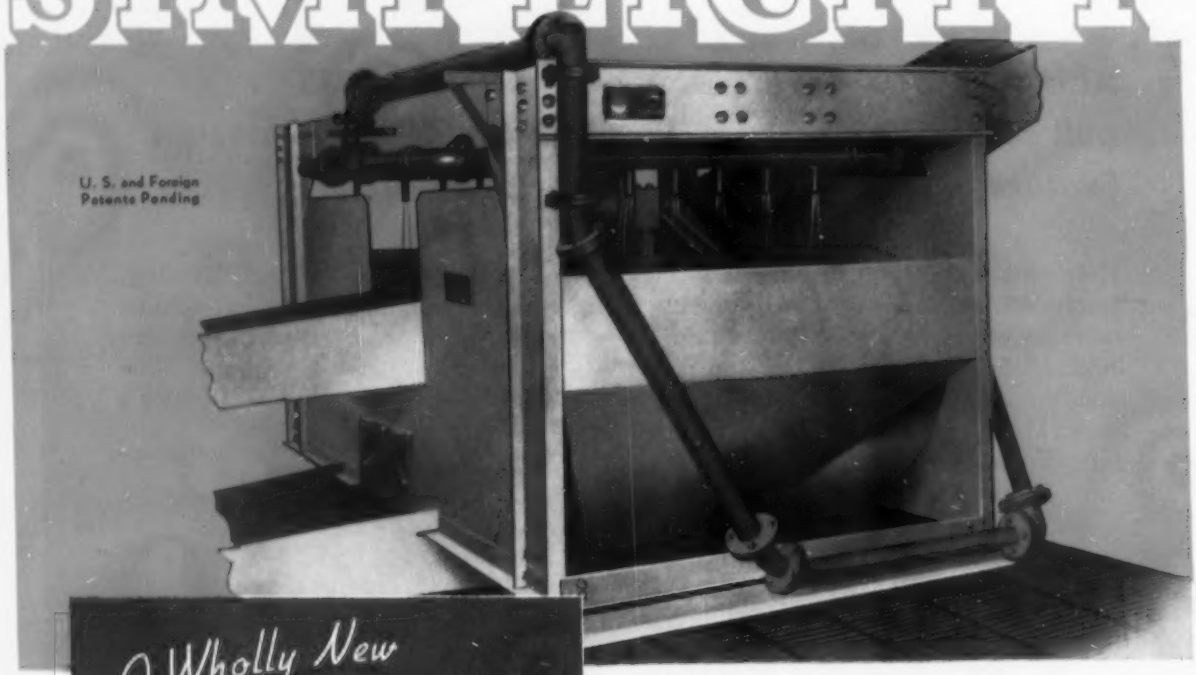
◀ **In Washington,** R. E. Bowen, of Moses Lake, uses his HD-16 crawler and 315 scraper to level land for irrigation at Warden. The HD-16's Allis-Chalmers diesel engine with follow-through combustion provides real lugging ability . . . has power to load the last few yards of tough, hard dirt. The 315's wide bowl permits wider wheel tread, yet keeps all wheels inside cutting edge for fast, smooth loading.

▲ **On a housing project,** this HD-16 and 315 team hauls loads like this on cycle after cycle. It's a long-life pair, too. The HD-16 has an all-steel, box-A main frame to soak up shocks and protect drive train . . . 1,000-hour lubrication intervals of truck wheels, idlers and support rollers eliminates daily maintenance—adds 30 minutes to every working day. The 315 scraper's loaded weight is distributed equally on all four wheels for longer tire life.

New O.C. Heavy-Media Vessel

THE 'LAST WORD' IN

SIMPLICITY



A Wholly New Approach to HMS

From top to bottom, the OCC Vessel is specifically designed to take advantage of the simplicity of the HMS process. The result is optimum metallurgical performance and trouble-free operation.

The previously common practice of adapting conventional types of equipment to Heavy-Media vessels necessarily resulted in cumbersome and complicated units. The outstanding advantage of the HMS process is its simplicity. Here are illustrations of how the revolutionary design of the OCC vessel capitalizes on this simplicity. A single rake performs both of the two basic HM separatory functions: maintenance of constant gravity in the medium; removal of sink. This rake is the only moving part in the vessel. There are no rotating parts in the medium; and no gears in its drive. The only friction is that between the rubber-tipped rake and the vessel bottom. For details . . .

Send for Information on Complete Pilot Plant Demonstration and Testing Services . . . Technical Bulletin

The ORE & CHEMICAL CORP.

Division: Mining & Milling Machinery

80 BROAD ST., NEW YORK 4, N.Y.

U.S. quarry tells how to speed loading of loose materials!

As soon as TraveLoader loads one truck, cross-conveyor is shifted to opposite side by operator from the driver's cab. Loading continues into waiting truck without interruption.

TraveLoader moves forward in any one of several working speeds... revolving feeder places a continuous flow of material on conveyor belt... any size truck is loaded in seconds.

The Karch Stone Co., of Celina, Ohio, U.S.A., stepped up their loading when they added a self-propelled, belt-type TraveLoader to their fleet. Now, after months of tough loading to state, county, and private trucks, Company President George Karch reports, *"The TraveLoader loads twice as fast as bucket-type loaders."*

Loads 8-ton trucks in 40 seconds

At the Karch quarry, 18 to 20 different specification aggregates are handled everyday. Materials range from lime to 3" rock. Working in any of the material stockpiles, the TraveLoader loads 6½ yds. in about 40 seconds, according to Mr. Karch. Bucket-type loaders working in the same material were timed at an average of 99 seconds. Recently, after the TraveLoader moved 2300 tons of crushed stone in one day, Mr. Karch commented, *"No other loader compares with the TraveLoader."*

Cross-conveyor balances load

The TraveLoader's screw-type feeder automatically adapts itself to the load ahead and keeps a continuous flow of material moving on to the conveyor belt. Cross-conveyor (optional equipment) loads trucks on either side. In stockpile loading, no time is wasted waiting for trucks to get into an exact loading position. Cross-conveyor may be shifted to truck's position, either side, by hydraulic control from the cab. This flexibility of loading conveyor also makes it easy to balance truck loads sidewise. Optional deflectors on ends of cross-conveyor give better balanced loads in trucks of all sizes.

Operator's cab centrally located

When loading, the Traveloader's centrally located cab... up out of the dust... gives operator clear visibility in all directions. Operator has full vision of feeder screw, conveyor, cross-conveyor, and truck. Loading is uninterrupted. When one truck is loaded, operator shifts cross-conveyor and material pours into waiting truck at other side. No front-end loader (with its lost motion in truck to truck turn-and-travel motion) can match the ease of operation, and fast loading obtained with TraveLoader. Find out how this rugged loader can cut delays on your loading, increase your loading capacity, decrease your loading costs. Ask your LeTourneau-Westinghouse Distributor for complete specifications.

AL-13-M-bw

LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company

HOW MARCY EXPERIENCE

WITH 2-STAGE GRINDING

Increases tonnage at lower cost

Mine and Smelter has specialized in the design, manufacture and application of Marcy Mills since 1915. The extensive research and experience during this time has resulted in many refinements in the grinding process. One of the most significant developments is 2-stage grinding.

Experience has proved two successful ways of using Marcy Open End Rod Mills for 2-stage grinding...

1. By addition of a grinding stage

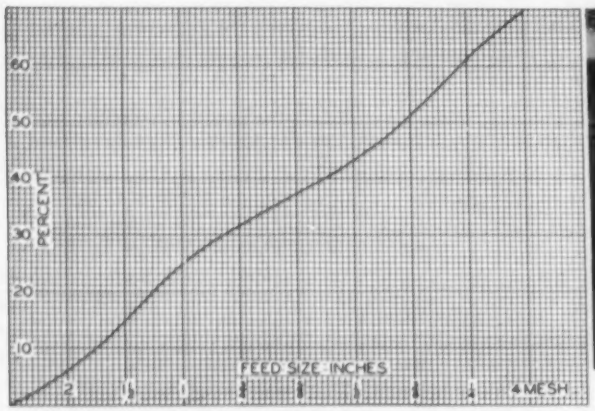
Adding Marcy Open End Rod Mills between existing crushing and grinding circuits...

- Permits larger size crusher discharge, thus greatly increases crushing capacity
- Rod mill can take 1" feed and produce a higher percentage of finished product than crusher
- Rod mill provides finer feed for ball mills, increasing their capacity
- Permits recovery of liberated mineral at coarser size

2. By replacing fine crushing

Replacing fine crushing with Marcy Open End Rod Mills gives all the advantages listed under No. 1, in addition to eliminating the high operating and maintenance costs of complex circuits of crushers, rolls, screens, elevators, etc.

Operating experience has proved that use of Marcy Open End Rod Mills for 2-stage grinding will increase tonnage at lower overall cost per ton



This graph shows increase in mill capacity with decrease in size of feed. For example if a rod mill was used to decrease ball mill feed from 1" to 4 mesh the ball mill capacity would be increased 45%.

This large copper company installed a 9½' x 12' Marcy Open End Rod Mill in parallel with its 2-stage roll-screen circuit. As a result of this test 17 Marcy Rod Mills were installed to replace all roll-screen circuits. Rod Mill feed is 1½" hard ore; grind is to 4% + 10 mesh; tonnage up to 2700 tons per day, each mill. They reduced costs and improved operating conditions.

The Mine & Smelter Supply Co.

DENVER • SALT LAKE CITY • EL PASO • NEW YORK

Representatives in Foreign Countries

FOR ACTUAL OPERATING DATA ON 2-STAGE GRINDING ← WRITE, WIRE OR CALL

How ONE MAN and ONE MACHINE saves you money on mine exploration

The HIGH-SPEED, self-loading D Tournapull has the versatility needed to speed all the exploratory phases of your mine development. This job-proved unit moves in or around any location at speeds up to 28 mph. It cuts grades accurately, hauls anywhere, and spreads in controlled layers. Its big tires effectively compact material. Where land restoration is required, the "D" is ideal for segregating topsoil, refilling and landscaping. Where ore-bearing soils are to be tested, the 138 hp "D" will self-load over 5 bank yards per trip for quick delivery to screens or hopper. Where dams or reservoirs are needed for water supply — ditches or sluiceways for drainage — the "D" moves in, gets the job done fast, and moves on to the next task without delay.

Big low-pressure tires, positive power steer and a unique power-transfer differential enable Tournapulls to travel slippery saddleback roads or through deep mud and sand which would stall an ordinary truck. Electric scraper and steer controls and a foam-rubber seat give easy operation and easy riding in tough going. These are but a few of the reasons why this fast utility tool speeds search and pilot tasks, cuts costs, and eliminates many inconveniences of exploratory operation. It will pay you to learn more about what it can do for you.

Tournapull—Trademark Reg. U.S. Pat. Off. DP-58-M-bw

The self-loading "D" handles all these jobs:

- Clears, levels sites for camps and drill setups. Eliminates cost of expensive cribbing.
- Strips surface material to expose bedrock. Gives you better access to formation.
- Builds, maintains and gravels access roads. Fills roads across soft, low areas.
- Loads, hauls material from open pits in 9-ton (7-yard) scraper.
- Hauls in supplies. Carries loads over terrain no other wheeled vehicle can cross.
- Levels building sites. Digs sludge basins, drainage ditches and sluiceways.
- Moves into any site under its own power — over pavement or cross-country.
- Supplies electricity for emergency lighting or temporary equipment operation.
- Plows snow from supply roads. Self-loads, hauls snow, ice from camp sites.
- Dozer blade available. One man can do clearing, build roads, drain, grade and strip.

LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

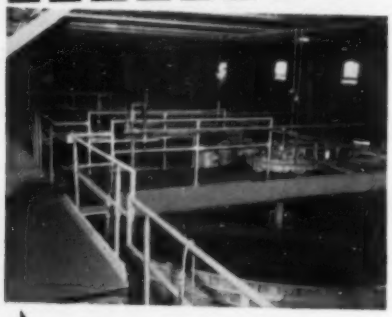
A Subsidiary of Westinghouse Air Brake Company

Dorr-Oliver Techniques AT PRONTO URANIUM

One of the first Canadian Mills to go into production utilizing ion exchange, Pronto Uranium has made skillful use of Dorr-Oliver techniques in almost every processing step in the plant. The photographs on these pages are arranged in flowsheet order to show the major treatment steps from primary grinding to final thickening ahead of dewatering.

1 GRINDING — One of two Dorr HX Classifiers installed in closed circuit. Each unit has a design overflow of 900 tons per day at 65% — 200 mesh.

2 THICKENING — Classifier overflows are thickened in two 40′ dia. Dorr Tray Thickeners (one shown) and the underflows at 65% solids are removed by Dorrco VM Pumps.



3 AGITATION — Eight 24′ dia. Dorr Agitators are used for acid leaching the uranium at 60% solids from the Thickener underflows. Three additional Agitators are used for pH adjustment of the leach slurry.

4 ION EXCHANGE — A Dorrco d-i System consisting of eight cells each 8′ dia. by 15′ deep with air domes receives the clarified pregnant solution. Inset shows ion exchange control panel.

5 AGITATION — Six 18′ dia. Dorr Agitators provide sufficient detention for complete precipitation of uranium concentrate from solutions received from Dorrco d-i System.

6 THICKENING — This special 32′ dia. Dorr Thickener equipped with a deep feed-well thickens precipitated slurry from Agitators ahead of dewatering.

DORR-OLIVER
INCORPORATED
WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT
STAMFORD • CONNECTICUT • U.S.A.

At Oro Grande, California

▲ Oversize pieces of limestone are readily pulled out of the blasted material and segregated for breaking.

▲ One of Tournatractor's jobs is moving equipment. Machine easily and quickly tows this heavy drill from one blast site to the next.

One fast rubber-tired tractor takes over all quarry clean-up ... speeds production

In Riverside Cement Company's limestone quarry at Oro Grande, California, there are many scattered jobs that must be done quickly, without interference to production. These jobs include clean-up around quarry shovels, leveling waste dumps, dozing overburden, towing other equipment around the quarry.

To do this variety of jobs at its Oro Grande property, Riverside Cement Company, of Los Angeles, first tried a 150 hp, 5.8 mph crawler tractor. They found the machine too slow. It couldn't get around fast enough to do its varied assignments.

More work done in less time

Recently Riverside Cement Company purchased and placed in service a 19 mph, 208 hp, rubber-tired Tournatractor. With the increased speed and flexibility of this unit, Riverside finds that critical jobs can now be completed in less time than before; eliminating production delays, cutting costs.

Big rubber tires "cushion" shock

Working on rocky quarry floor, the big, low-pressure Tournatractor tires absorb shock, ride smoothly over rough going, with minimum "wear-and-tear" to operator and machine. And Tournatractor's power-train is sealed against quarry dust and gritty materials. Lubricants are kept clean and free from abrasives, damage and wear to bearings and moving parts is prevented, maintenance time and expense is reduced.

Investigate Tournatractors

For fast, all-around mine and quarry duty, investigate the highly maneuverable Tournatractor. Let us send you some owner-verified reports on Tournatractor performance. Write for full details.

▲ Tournatractor's 19 mph speed handles shovel clean-up in a hurry ... cuts work delays ... increases daily output. Rubber-tired tractor "outruns" crawler 2-to-1.

▲ Air compressors, and other mine equipment, moved fast from one job location to another. Tournatractor gets more work done, fast, at low operating cost.

Tournatractor—Trademark Reg. U.S. Pat. Off. T-872-Q-b

LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company

Gardner-Denver... Serving the World's Basic Industries

NEW Super Portable Rotary · RP900DA

Delivery, cfm	900
Control	*New* Simplified Thriftmeter
Length	13′9″
Width	6′9″
Height	8′5″
Turning Radius	18′
Weight, dry	12,790 lb.

NEW Super Rock Drill · DH143

Hammer Diameter	5½″
Drill Rod Size	1⅞″ hex.
Weight, with crawler	10,500 lb.
Rod Change, up to	20′
Height, Mast at Vertical	29′
Length	11′
Width	8½′

NEW Gardner-Denver rock work team

Here's a new Gardner-Denver team for heavy-duty rock work in open cuts, in quarries, in open pit mines.

The new Gardner-Denver Rotary 900 Portable gives you extra air capacity for bigger drills or more of them —without additional engines and equipment to care for. Plus these popular Gardner-Denver features: clutch for easy cold-weather starting . . . circulating water system for warming up the compressor oil before it turns over . . . super-simplicity for easy field maintenance.

The new Gardner-Denver 5½″ Model DH143 gives you an entirely new rock drill class. Now you can select the proper bit size and plan hole spacing for best breakage in any ground. All controls are conveniently mounted at the operator's station. Available with a new Gardner-Denver air-powered crawler, or for mounting on your own heavy diesel tractor.

Send for the facts today! There's a Gardner-Denver distributor in your area—see him for details.

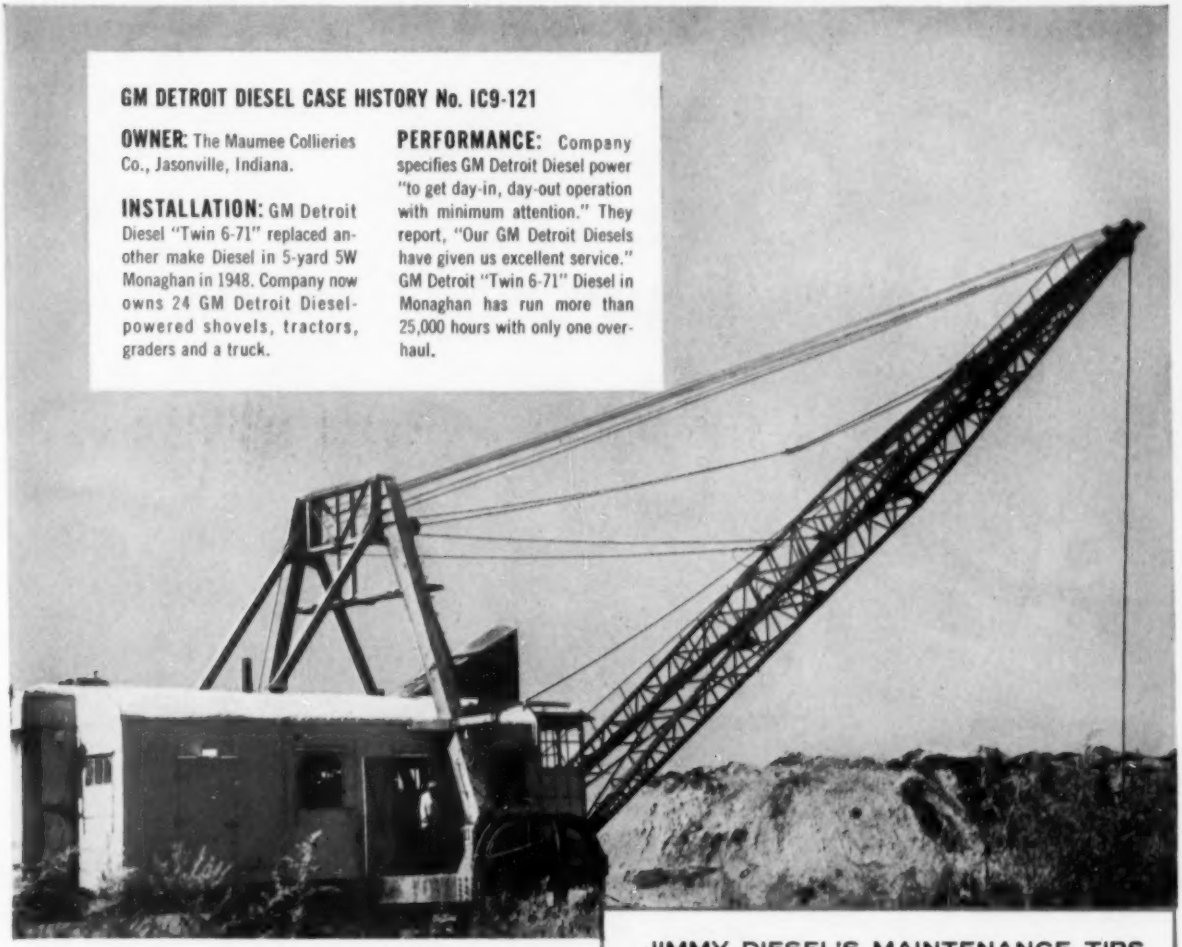
GARDNER - DENVER

THE QUALITY LEADER IN COMPRESSORS, PUMPS, ROCK DRILLS AND AIR TOOLS FOR CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY

Gardner-Denver Company, Quincy, Illinois

Export Division: 233 Broadway, New York 7, N. Y., U.S.A.

"ON THE JOB DAY-IN AND DAY-OUT"



GM DETROIT DIESEL CASE HISTORY No. IC9-121

OWNER: The Maumee Collieries Co., Jasonville, Indiana.

INSTALLATION: GM Detroit Diesel "Twin 6-71" replaced another make Diesel in 5-yard 5W Monaghan in 1948. Company now owns 24 GM Detroit Diesel-powered shovels, tractors, graders and a truck.

PERFORMANCE: Company specifies GM Detroit Diesel power "to get day-in, day-out operation with minimum attention." They report, "Our GM Detroit Diesels have given us excellent service." GM Detroit "Twin 6-71" Diesel in Monaghan has run more than 25,000 hours with only one overhaul.

THE STORY of the Maumee Collieries is duplicated thousands of times.

A customer gets his first General Motors Detroit Diesel. And it quickly establishes a fast-working, cost-cutting reputation.

Then he buys another—and another—until soon he's standardized on GM Detroit Diesel power.

For a GM Detroit Diesel is packed with real snap that makes the job go faster—sets the pace for your whole operation. And after you see what this Diesel can do, you'll be satisfied with no other Diesel.

The reasons are simple. Two-cycle operation. Easy maintenance. Simple repairs. Low-cost, interchangeable parts and fast service everywhere.

These are just a few reasons why it's *America's first choice Diesel.* Your local GM Detroit Diesel distributor can tell you the full story or write direct.

JIMMY DIESEL'S MAINTENANCE TIPS

Got Spring Fever? Maybe your engines have, too. Your GM Detroit Diesel distributor or dealer can snap 'em out of it with a spring tune-up. And he'll help you set up a preventive maintenance program to keep your engines running right all summer long. Take care of your engines and they'll take care of you and remember—Preventive Maintenance Doesn't Cost—It Pays.

DETROIT DIESEL

Engine Division
of General Motors
Detroit 28, Michigan

Single Engines . . . 50 to 500 H.P. Multiple Units . . . Up to 893 H.P.

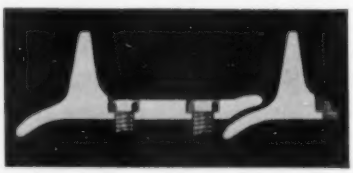
America's Largest Builder of Diesel Engines

Switch to extra-tough AMSCO® MANGANESE STEEL TRACTOR SHOES

When the going is extra tough, as in rocky areas or abrasive mineral soils . . . tractor shoe replacement can become a major cost item. Both repair time and down time eat up profits.

Switch to "the toughest steel known" . . . Amsco Manganese Steel . . . for tracks and grouser bars. Check their much longer service life against the moderate extra cost. Add to this the greater efficiency and pulling power of your tractor, over a longer period of time. The answer: *important operating economies.*

Amsco Manganese Steel gives excellent resistance to abrasion accompanied by impact . . . actually *work-hardens* in use. Write for full information on long-wearing Amsco Manganese Steel Tractor Shoes—the economical answer to high track-replacement costs.



COUNTER-SUNK BOLT HOLES

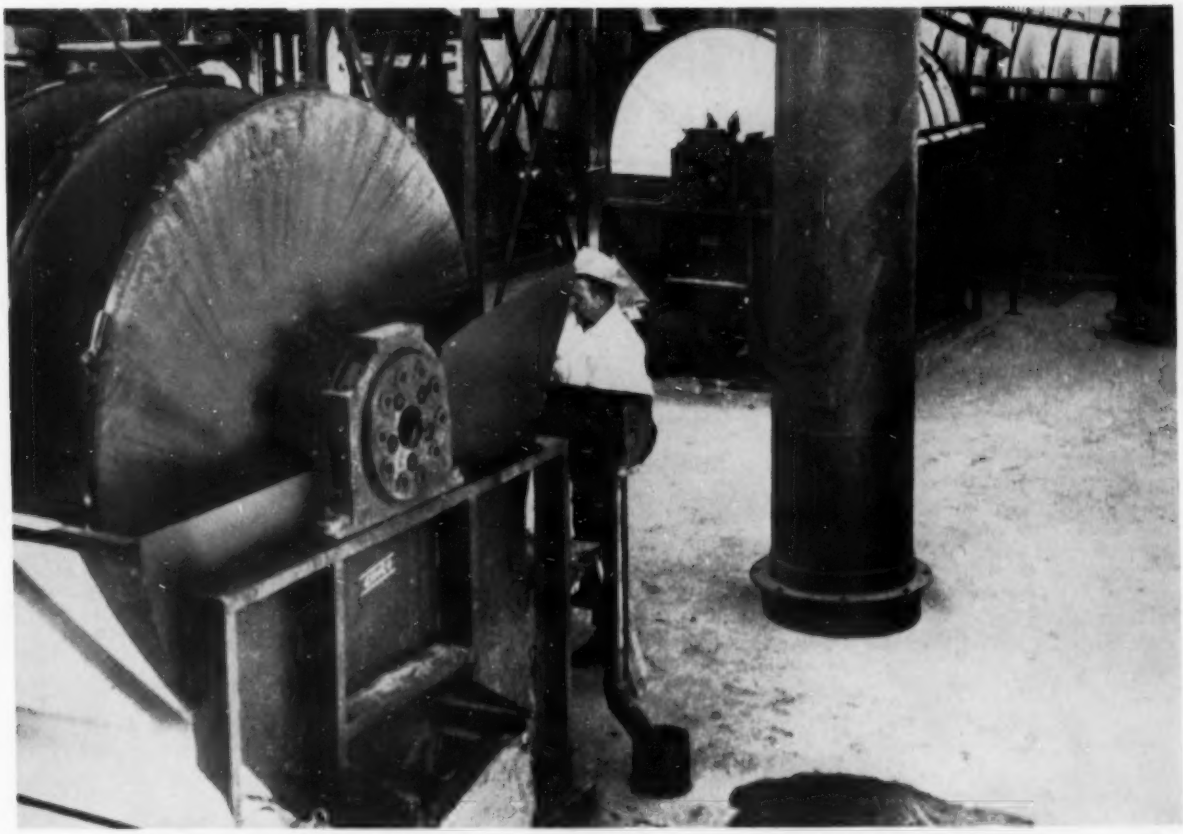
Amsco Track Shoes have holes countersunk for less wear on bolts. Saves cost of replacing bolts when changing shoes.

AMERICAN Brake Shoe COMPANY

AMSCO

American Manganese Steel Division • Chicago Heights, Ill.

OTHER PLANTS IN: DENVER, LOS ANGELES, NEW CASTLE, DELAWARE, OAKLAND, ST. LOUIS, JOLIETTE, QUEBEC



EIMCO AGIDISCS REDUCE MOISTURE IN COPPER CONCENTRATE

Uniformity of cake formation produces higher tonnages at lower moisture

Recent installations of Eimco Agidisc Filters show the superiority of this equipment in dewatering metallurgical concentrates.

One installation on a copper concentrate with an 80% minus 326 mesh feed has been dewatered to a moisture content of approximately 12%. This installation will produce approximately 260 lbs. per square foot per hour when it is in full operation.

The Agidisc provides a smooth, evenly distributed cake on the sectors. The cake moistures are even over the surface of the disc because the particle sizes are evenly distributed. On the Agidisc you completely eliminate (1) thin feathered edges of cakes near the sector bell, (2) heavy, soggy classification rings near the periphery of the sector. (3) Classified materials in special belts around the sectors as per particle size, (4) scrubbing media in or through channels cut in fast settling slurry deposits in the bottom of the filter tank.

Only Eimco makes the Agidisc — Investigate the extra values of using this filter on your dewatering problems.

THE EIMCO CORPORATION

Salt Lake City, Utah—U.S.A. • Export Offices: Eimco Bldg., 52 South St., New York City

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B-185

In Australia —
Carpco Australasia, Pty. Ltd.
Main Office & Works
22-24 Thurlow Street
New Market, Brisbane

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John Carruthers & Co. Pty. Ltd.
Sydney, Australia

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In Singapore, Malaya, and Thailand —
Guthrie & Co.
Singapore and all other leading cities

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In India —
Mecanico Industrial Engineers
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In Bolivia —
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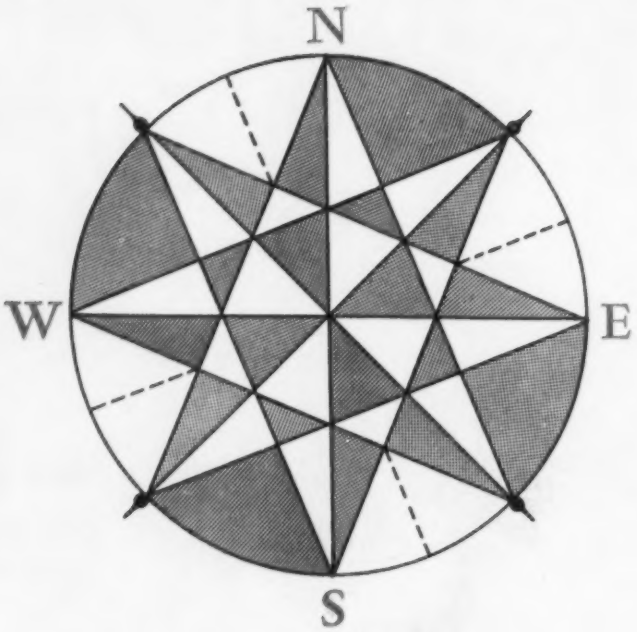
La Paz



ON THE GO...
ALL OVER THE WORLD

Due to progressive metallurgical technology in using modern methods of specific gravity, high tension, and magnetic separation, Carpco systems are now in use for tin, titanium, tungsten, zirconium, thorium, uranium, and many other minerals and metals.

Planning complete installations is an important part of our service. The five component Carpco companies are completely integrated — our engineers have come to us from the four corners of the earth and are capable of solving difficult and unusual problems.

From the smallest detail to completely packaged plants — it's Carpco *all over the world!*

Carpco

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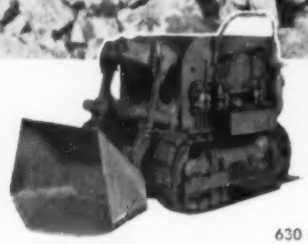
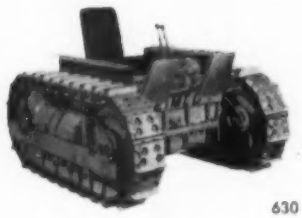
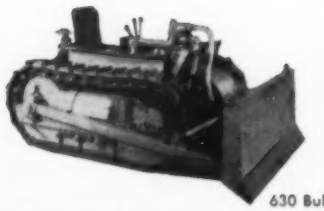


630 Loader



630 Tractor



630 Bulldozer

NEW SHAFT SINKING TECHNIQUES

Shaft sinking contractors have developed a new technique for loading out the broken rock in the bottom of the shaft by using the Eimco 630 crawler.

The method consists of lowering the Eimco immediately after the blast and proceeding to muck out the round into 3-yard tubs. Time per loading is approximately 2½ minutes but will probably improve as the crew gets more familiar with the new equipment.

The difference in the techniques is in the method of shooting the bottom which leaves the bottom in the shape of a "V" which provides a "face in the shaft for the loader operating on an incline.

The introduction of the Eimco 630 in shaft mucking eliminates the necessity of using expensive single purpose equipment, special framing in the shaft, temporary guides and other special setups. When the shaft is completed the Eimco is ready to work in the drifts on production loading.

Send for more information on the Eimco 630.

THE EIMCO CORPORATION

Salt Lake City, Utah—U.S.A. • Export Offices: Eimco Bldg., 52 South St., New York City

New York, N. Y. Chicago, Ill. San Francisco, Calif. El Paso, Tex. Birmingham, Ala. Duluth, Minn. Kellogg, Ida. Baltimore, Md. Pittsburgh, Pa. Seattle, Wash. Pasadena, Calif. Houston, Texas Vancouver, B. C. London, England Gateshead, England Paris, France Milan, Italy Johannesburg, South Africa

B-181

from Asbestos to Zinc...

ASBESTOS	IRON ORE	SILVER
ANTIMONY	LEAD	SLAG
CEMENT	LIMESTONE	TACONITE
CHROMIUM	MANGANESE	TIN
COPPER	MOLYBDENUM	TITANIUM
DOLOMITE	NICKEL	TUNGSTEN
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SYMONS CONE CRUSHERS

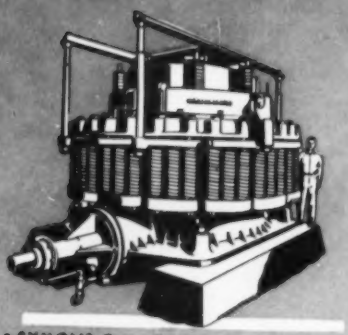
are the leading choice for large volume production of finely crushed material at low cost

In all of the great ore and industrial mineral operations throughout the world, ranging from Asbestos on through Zinc, Symons Cone Crushers have consistently aided man by making possible the efficient reduction of these materials to meet growing demands.

Continual repeat orders for Symons Cones from the world's leading ore and mineral producers conclusively establish this fact.

Whenever *you* are confronted with high capacity fine reduction crushing problems, it will pay you to investigate the advantages of Symons Cone Crushers . . . *the machines that revolutionized crushing practice.*

Nordberg Mfg. Co., Milwaukee, Wis.



• SYMONS Cone Crushers are built in Standard, Short Head, and Intermediate types, with crushing heads from 22 inches to 7 feet in diameter—in capacities from 6 to over 900 tons per hour.

Symons Gyratory Crushers

Grinding Mills

Mine Hoists

Vibrating Bar Grizzlies

Diesel Engines

©1956, Nordberg Mfg. Co.

SYMONS . . . A REGISTERED NORDBERG TRADEMARK KNOWN THROUGHOUT THE WORLD

C156

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SYMONS SCREENS NORDBERG

MACHINERY FOR PROCESSING ORES and INDUSTRIAL MINERALS

NEW YORK • SAN FRANCISCO • DULUTH • WASHINGTON
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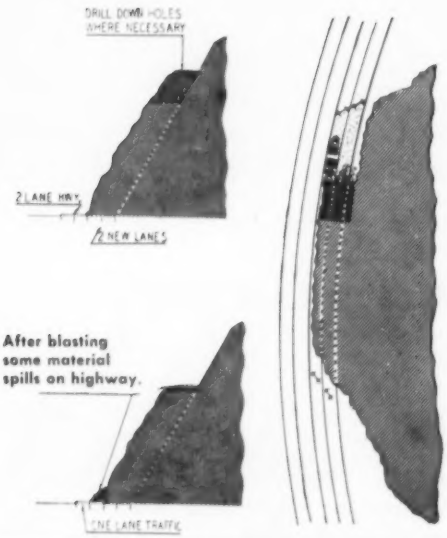
Highway Widening Jobs Need Not Obstruct Traffic



Contractors can take highway widening jobs without building bypass roads to carry traffic.

The busy highway shown above is being widened from two lanes to four lanes using the method described at left.

The problem was solved by keeping the trucks and excavating equipment off the highway so that it remained open for traffic except at intervals when shooting was necessary.

The Eimco 105 Tractor-Excavator was ideally suited to this type of job. It loads large trucks full from the end and cleans up the big boulders quickly. With the Eimco operating in a straight line, forward to dig and load and reverse, with the bucket moving overhead, to discharge.

Digging in dirt and consolidated material can often be accomplished without blasting the material at all. The Eimco 105 will load in dirt at the rate of 10 yards per minute and in rock the rate of loading is 6-7½ yards per minute depending on the material.

Eimcos are heavy-duty machines built to handle the toughest kind of jobs. They can apply more thrust force at the digging lip than larger equipment costing several times as much.

Write for complete information on Eimco 105 Tractors.

THE EIMCO CORPORATION

Salt Lake City, Utah—U.S.A. • Export Offices: Eimco Bldg., 52 South St., New York City

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B-187

BIGGEST DIGGER ON TWO CRAWLERS

The 10 yard dipper of this big digger is impressive, for the MARION 191-M is the world's largest loading shovel on two crawlers. Equally important on the iron range is the fast, small-machine cycle time that converts mountains into rail car loads in jig time.

MARION POWER SHOVEL COMPANY • MARION, OHIO

Butte, Montana

Keep your buckets moving with TIREX

Notice the line between the bucket and boom base? That's electric trailing cable furnishing power to the shovel. Whatever happens to it to stop current flow stops the shovel, idles workmen, costs money.

Spilling ore beats on the cable. The truck behind the upper end of the dipper sticks runs over it sometimes. High temperature of the sun-heated pit and current load fry it. It gets abraded, strained, soaked in water, and covered with oil. That's why it should be the best cable that money can buy.

Simplex-TIREX High Voltage Portable Cable has the toughest, most abrasion-resistant jacket known. It is designed and engineered especially for mining requirements. It is the only trailing cable made with the famous Selenium Neoprene Armor and is cured in lead. Used to transmit power to shovels, dredges, cranes, and draglines, it is resistant to moisture, acids, alkalies, oil, flame, and sunlight.

If you're not now using Simplex-TIREX Trailing Cable, write for Catalog 1012 to the address below, or contact your nearest Simplex representative.

Simplex WIRES & CABLES

TIREX CORDS AND CABLES *are made only by the*

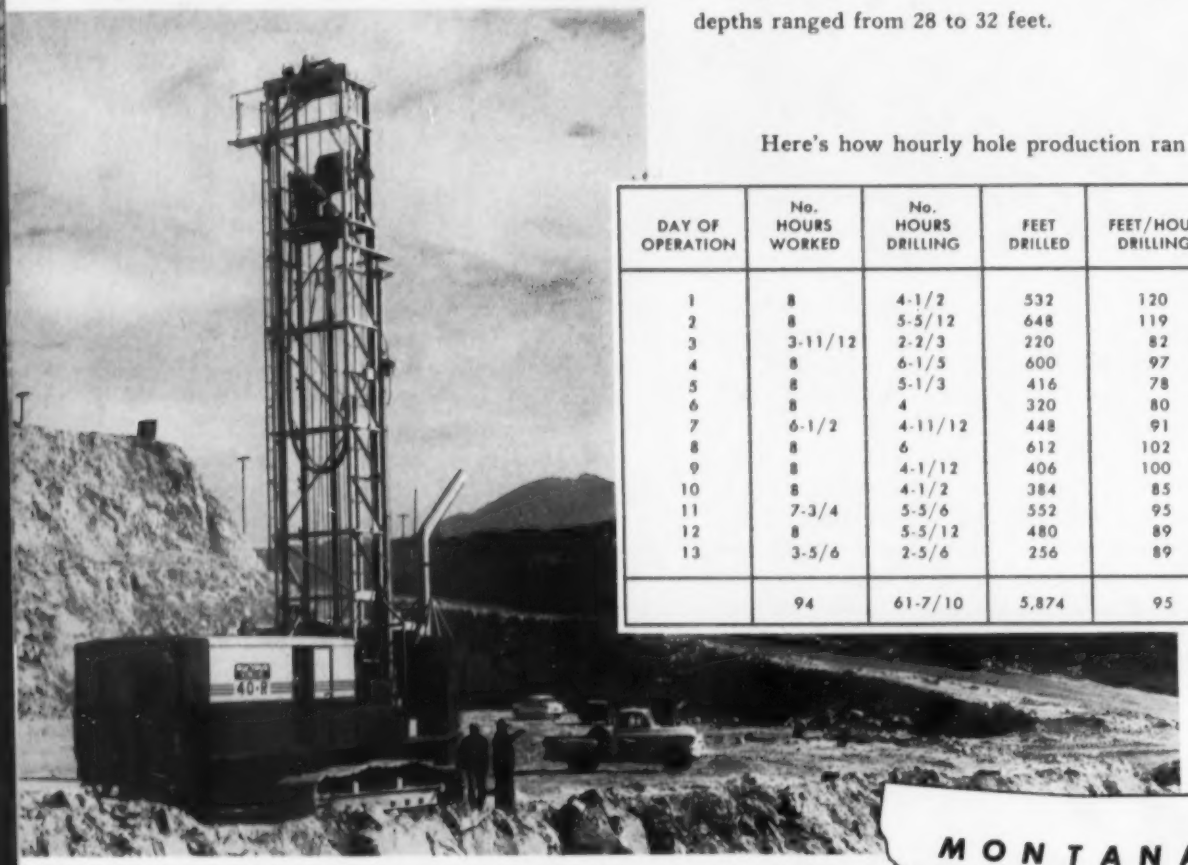
SIMPLEX WIRE & CABLE CO., 79 Sidney St., Cambridge 39, Mass.

Butte, Montana . . .

another example of how Bucyrus-Erie rotaries cut costs on big-volume stripping jobs

F & S Contracting Company and Morrison-Knudsen Company, Inc., joint venture stripping contractors on a large Montana copper property, have adopted a modern high-speed drilling program which allows maximum economy in use of shovel loading and truck hauling units. The drill chosen to meet their needs was this electrically powered Bucyrus-Erie 40-R rotary.

According to F & S officials, the 40-R has worked so rapidly that it has stayed ahead of a 6-yd. shovel, even when operating less than a full shift each day. Drilling procedure consists of putting down 9-in. diameter holes spaced on 21-ft. centers. A daily log for the initial period of operation shows the 40-R drilled 5,874 feet of hole through decomposed granitic rock in 62 hours drilling time — a rate of 95 feet per hour. Hole depths ranged from 28 to 32 feet.



Here's how hourly hole production ran:

DAY OF OPERATION	No. HOURS WORKED	No. HOURS DRILLING	FEET DRILLED	FEET/HOUR DRILLING	FEET/SHIFT HOUR
1	8	4-1/2	532	120	67
2	8	5-5/12	648	119	81
3	3-11/12	2-2/3	220	82	56
4	8	6-1/5	600	97	75
5	8	5-1/3	416	78	52
6	8	4	320	80	40
7	6-1/2	4-11/12	448	91	69
8	8	6	612	102	77
9	8	4-1/12	406	100	51
10	8	4-1/2	384	85	48
11	7-3/4	5-5/6	552	95	71
12	8	5-5/12	480	89	60
13	3-5/6	2-5/6	256	89	66
	94	61-7/10	5,874	95	62-1/2

When excavation quantities run high, the fast, large-diameter hole making ability of Bucyrus-Erie rotaries really pays off. Let us tell you how they can cut preparation time and drilling costs in your operations. Write today for detailed, illustrated literature. Model 40-R drills 6-3/4 to 9-in. holes and is available with either diesel-electric or full electric power. Model 50-R drills 9-7/8 to 12-1/4-in. holes and is electrically powered.

BUCYRUS ERIE

33B56C

South Milwaukee, Wisconsin

76th YEAR OF SERVICE TO MEN WHO SHAPE THE EARTH

The Engineer's Report

CASE HISTORY

PRODUCT RPM Delo Oils

FIRM Bagdad Copper Corp., Bagdad, Arizona

Biggest truck in the world uses RPM DELO Oil!

246,000 POUNDS TOTAL LOAD, 48 tons of truck and 75 tons load, are hauled out of the Bagdad Copper Corp.'s ore pit at Bagdad, Arizona, by the two 350 h.p. supercharged diesels in this unit. RPM DELO Special Lubricating Oil is used in the engines as specified by Mr. Ernest Dickie, General Manager of Bagdad, on the basis of his years of experience with RPM DELO Oils in many other heavy-duty engines.

The big truck, described as the largest in the world, was designed by Mr. Dickie and engineers of Dart Truck Co., builders. Power is transmitted through 3-stage torque converters. All controls are powered.

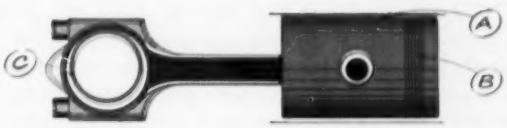
FREE FOLDER tells you about all the RPM DELO Oils and how they meet every heavy-duty engine condition. Write or call for it today.

FOR MORE INFORMATION about petroleum products of any kind or the name of your nearest distributor, write or call any of the companies listed below.

RPM DELO LUBRICATING OILS

TRADEMARK "RPM DELO" REG. U. S. PAT. OFF.

How RPM DELO Oils reduce wear, corrosion, oxidation in all heavy-duty engines



A. Contain special additives that provide metal-adhesion qualities...protect parts whether hot or cold, running or idle.

B. Anti-oxidant resists deterioration of oil and formation of lacquer...prevents ring sticking. Detergent keeps parts clean...helps prevent piston scuffing.

C. Special compounds stop corrosion of any bearing metal and foaming in crankcase.

STANDARD OIL COMPANY OF CALIFORNIA
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ELIMINATE TIME-WASTING DRILL STEEL CHANGES!

You can quickly interchange both TIMKEN® rock bit types on the same drill steel—right on the job

TIMKEN® multi-use and carbide insert bits eliminate the time wasted in going after a different set of steels whenever bit types are changed. Timken rock bits are interchangeable. Dozens of different bits fit the same drill steel. And it takes only a minute to unscrew one type of Timken rock bit and screw a different type bit on the same drill steel.

With Timken rock bits, your men can quickly switch to the most economical bit as the ground changes—right on the job. And because dozens of different Timken multi-use and carbide insert bits fit the same drill steel, you don't have to carry a large drill steel inventory.

Both Timken multi-use and carbide insert bits are made from electric furnace Timken fine alloy steel. And their special shoulder union keeps drilling impact from damaging the threads.

If you have a drilling problem, call our rock bit engineers. They'll be glad to help you. And there's no obligation. Just write: The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".

WHERE YOU CUT COSTS WITH TIMKEN MULTI-USE BITS

Most economical for ordinary ground. With correct and controlled reconditioning, they give lowest cost per foot of hole when full increments of steel can be used.

WHERE YOU CUT COSTS WITH TIMKEN CARBIDE INSERT BITS

Give highest speed through hard, abrasive ground. Also most economical for constant-gauge holes, small diameter holes, very deep holes.

. . . your best bet for the best bit. . . for every job

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

Prospecting. The Universal 'Jeep'* with the extra traction of its 4-wheel drive, takes men and equipment anywhere on the lease for prospecting, exploring or survey work. It climbs grades as steep as 60%, goes where other vehicles can't go.

Speed your mining operations with 'Jeep' versatility and all-wheel traction!

Transportation. The 4-Wheel-Drive 'Jeep' Truck transports men and equipment around the mine or between mines. Its all-wheel traction gets men, supplies and equipment wherever needed.

Mobile power. The versatile 'Jeep' gets to the job with sure dependability, and with power take-off supplies its own power to operate a portable drill, above. It also operates winches, welders, compressors, generators and many other types of equipment.

Rugged 'Jeep' vehicles are always on-the-job, in virtually every phase of mining. From initial surveys to transportation of men and equipment in the field, they help keep operations on schedule every day of the year.

No other vehicles match the 'Jeep' family for all-around mobility, range of performance and go-anywhere ability. On the highway they travel at top legal speeds in conventional 2-wheel drive. But, when the going gets tough, the extra traction of their 4-wheel drive hauls trailers in trackless mining, or carries personnel with parts and supplies over rugged terrain, through mud, snow or soft earth — in good weather or bad — to help keep maintenance and service work moving smoothly. These vehicles go where others stop cold in the heavy, rough going of mining projects.

'Jeep' vehicles supplement heavy-duty equipment, spread their costs over a wide variety of jobs, give you additional savings through long life and low maintenance costs. Ask your Willys dealer for a practical, on-the-job demonstration.

The 'Jeep'®

family of 4-Wheel-Drive Vehicles

WILLYS... makers of the world's most useful vehicles

*Model CJ-5 shown

WILLYS MOTORS, INC., TOLEDO 1, OHIO

GISMO METHOD SETS NEW

New Production Records and Drastic Cuts in Man-hour Costs Foreseen!

COULD THIS BE THE BEGINNING of the "Gismo Age" in rock mining? One mine operator has said: "The Gismo is going to revolutionize rock excavation methods in much the same manner that large tractor drawn earth moving scrapers have revolutionized the earth moving procedure."

One new mine now being mechanized by the Gismo Method contemplates a production of 2,000 tons per day at an overall cost of about $1.00 per ton. Production is forecasted to be approximately 50 tons per man when operated on a 2,000 ton per day basis and 57 tons per man on a 4,000 ton basis. The deviser includes all men to be employed for production, surface and underground, including all supervisors. The above projection is based on results obtained over a three year period by this system in a similar mine.

An older mine, changing over to the Gismo Method, has increased tonnage per man-shift almost 10 times in the stoping operations. Compared to the conventional method used in 1950, the Gismo Method has halved both development and labor costs.

What is this equipment? It is a general purpose utility self-loading transport that is simple, versatile and built to take the punishment of rock excavation. No special development facilities or conditions are usually required. It operates in sloping ore bodies with irregular outlines, as well as large or relatively small openings. It loads in development or production . . . transports . . . supports 2 to 5 jib mounted drills . . . back fills, moves boulder rocks . . . makes its own roadways and cleans up completely. It can load and transport up to 100 tons per hour with a 300 ft. haul.

It's an extremely simple piece of equipment requiring little maintenance. The Gismo's initial cost can be reasonably compared with one year's maintenance cost alone of much of the conventional equipment in present use.

It makes possible a mining method requiring few machines, few men, less planning and integration. It permits total mechanization of your mine—the solution to high man-hour and materials cost.

We urge you to compare the Gismo Method with other methods—from initial investment to overall effect on your operation's efficiency. Call, wire or write us today! *Sanford-Day Iron Works, Inc., P. O. Box 1511 . . . Telephone 3-4191, Knoxville, Tennessee.*

Sanford-Day IRON WORKS

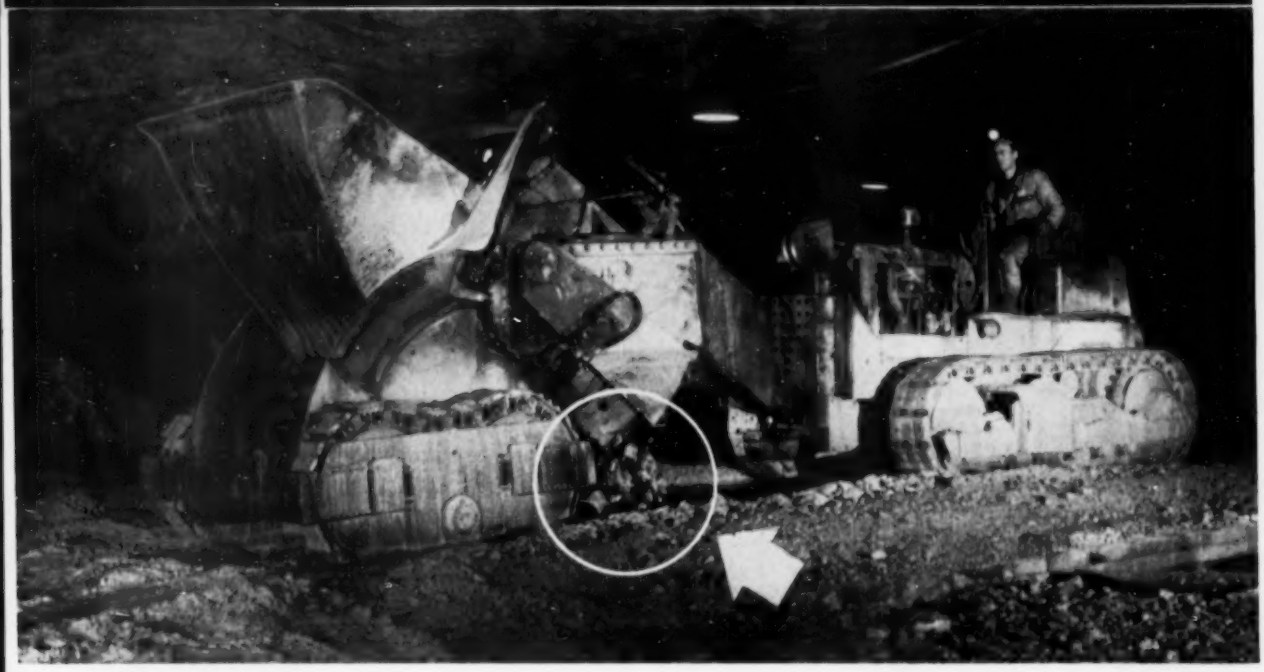
KNOXVILLE • TENNESSEE

AND BROWN-FAYRO DIVISION

MINE CARS, All Types - PRECISION WHEELS - "Brownie" HOISTS CAR RETARDERS - SPOTTERS PUMPS - OIL SPRAY SYSTEMS

LOADING (MUCKING)— a one-man operation! The speed of the GISMO Self-Loading Transport can be fully appreciated and understood only when seen in actual operation. With sufficient ore and ample surge capacity, one GISMO as a self-loading transport and one GISMO equipped as a stope drilling jumbo will excavate out of a hard rock face over 400 tons in a six hour working time shift. The GISMO handles boulders . . . sets them aside for secondary blasting . . . and does not require a bulldozer, road grader or any other accessory device. The operator has complete control of his shoveling grade—can always look directly at the dipper edge. The shoveling action is gentle. Carrying capacity of the GISMO shown working above is 6 tons. Other capacities are available.

GOALS FOR ROCK MINING!

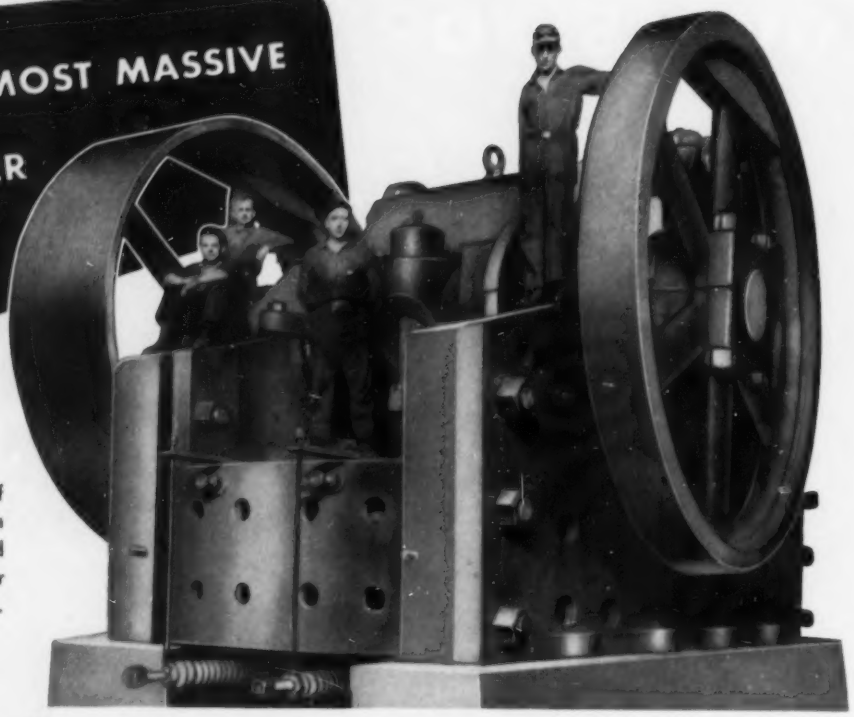


DUMPING: direct into surge pocket . . . skip pocket . . . conveyor for truck loading . . . or mine cars with ramps (for development work). GISMO above is dumping load into surge pocket. Both when mucking (loading material into body of GISMO) and when dumping the load, the dipper or shovel head is in position shown above. The surge pocket disconnects from a time cycle standpoint the next operation, transportation—permitting GISMO and the transportation system to operate independently of each other for maximum efficiency and production.

TRAMMING: fast and highly maneuverable! GISMO shown above is transporting load to a surge pocket. When emptied, GISMO will return to reload with dipper in position shown. As you can guess, the GISMO is a very simple machine functionally and mechanically. Compared to any other loading or mucking device (none of which are transports), the GISMO has a very large capacity.

DRILLING: The GISMO will mount 2, 3, 4 or 5 drills at ideal locations for the efficient drilling of small or large headings, benches, rib-slabbing or back-slabbing. The GISMO Stope Drilling Jumbo mounting four drills and operated by two men often averages by the month over 400 feet per man shift. The Gismo Drill Jumbo can be easily converted to a Gismo Self-Loading Transport.

STRONGEST MOST MASSIVE JAW CRUSHER BUILT



Send for your copy of Traylor Bulletin 125 with complete specifications and features of all Traylor Type S Jaw Crushers.

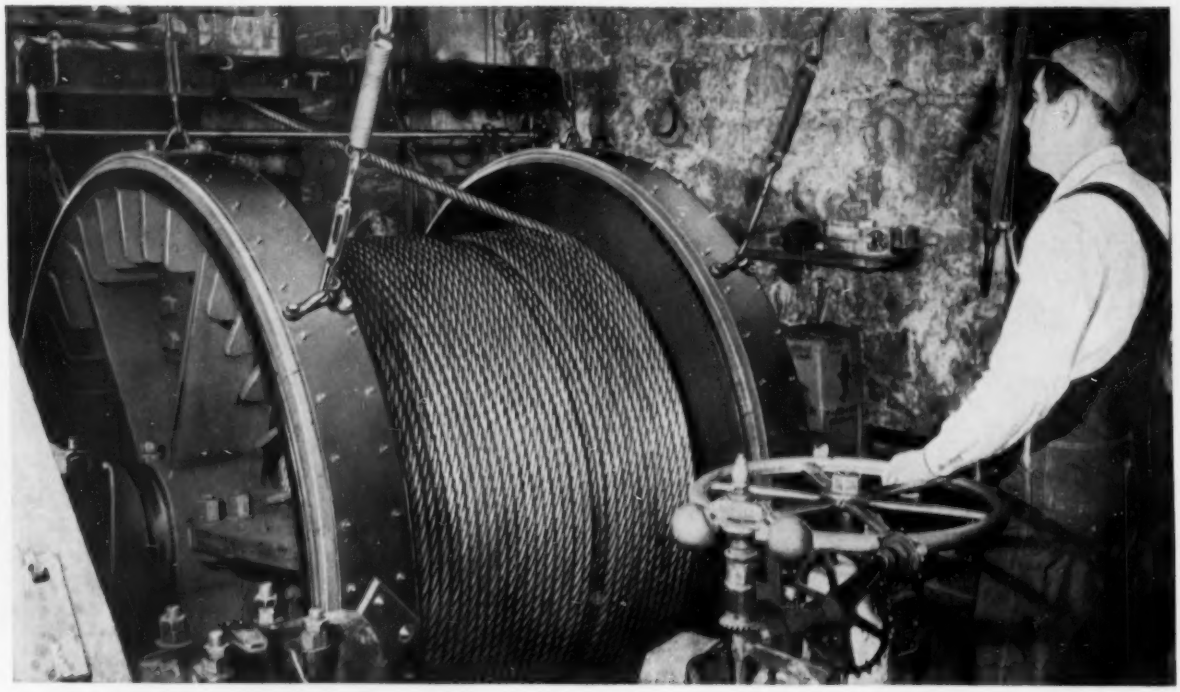
Traylor Type S JAW CRUSHERS FOR HEAVY DUTY MINING OPERATIONS

Traylor Type S Jaw Crushers are designed to stand up under the most severe production schedules. Exclusive Traylor features assure peak production with an absolute minimum of maintenance and greatly reduced power requirements. Traylor original Curved Jaw Plates apply power as a direct crushing force. Lifting and churning of the feed is reduced . . . choking and packing is practically eliminated. This assures a more uniform product with less plate wear. As a result, Traylor Curved Jaw Plates often outlast ordinary plates by as much as 3 to 1.

Traylor Type S Jaw Crushers are custom built to meet your particular requirements and operating conditions. For example, a 48″ x 60″ Traylor Type S Jaw Crusher can be built to produce 220 tons of 3″ product . . . or 550 tons of 9″ product an hour . . . on a maximum of 180 H.P. The steel frames of Type S Crushers can be built in 6 sections to facilitate handling and transportation. Seven sizes offer production capacities up to 1,000 tons per hour with feed openings ranging from 36″ x 42″ to 60″ x 84″.

A Traylor leads to greater profits

TRAYLOR ENGINEERING & MFG. CO.
801 MILL ST., ALLENTOWN, PA.
SALES OFFICES: New York • Chicago • San Francisco
Canadian Mfr: Canadian Vickers, Ltd., Montreal, P.Q.



Another hoistman says . . .

"Tiger Brand spools best . . . doesn't fight"

George Marinos, hoistman at Utah's Royal Coal Co.'s Mine, says, "Tiger Brand Wire Rope doesn't twist and fight on the drum." And when wire rope makes this kind of friend—you know the rope has earned the compliment. Such men are only impressed by performance. George has had 2,200 feet of Tiger Brand rope on for the past twenty months. And it's been twenty months of continual stress and scrubbing for the rope. Yet this USS wire rope is still in top shape and promises many more months of dependable service.

1⅜" Tiger Brand brings up another 25-ton load. This haulageway pitches down a steep 34% grade and whips around such sharp curves that switchbacks are required. The Royal Mine has been working 2 shifts for about 24 months —that's about 406,000 tons of coal this Tiger Brand line has already hauled. The hoistmen say its tough, fatigue-resisting wires and spooling qualities make it ideal for haulage work.

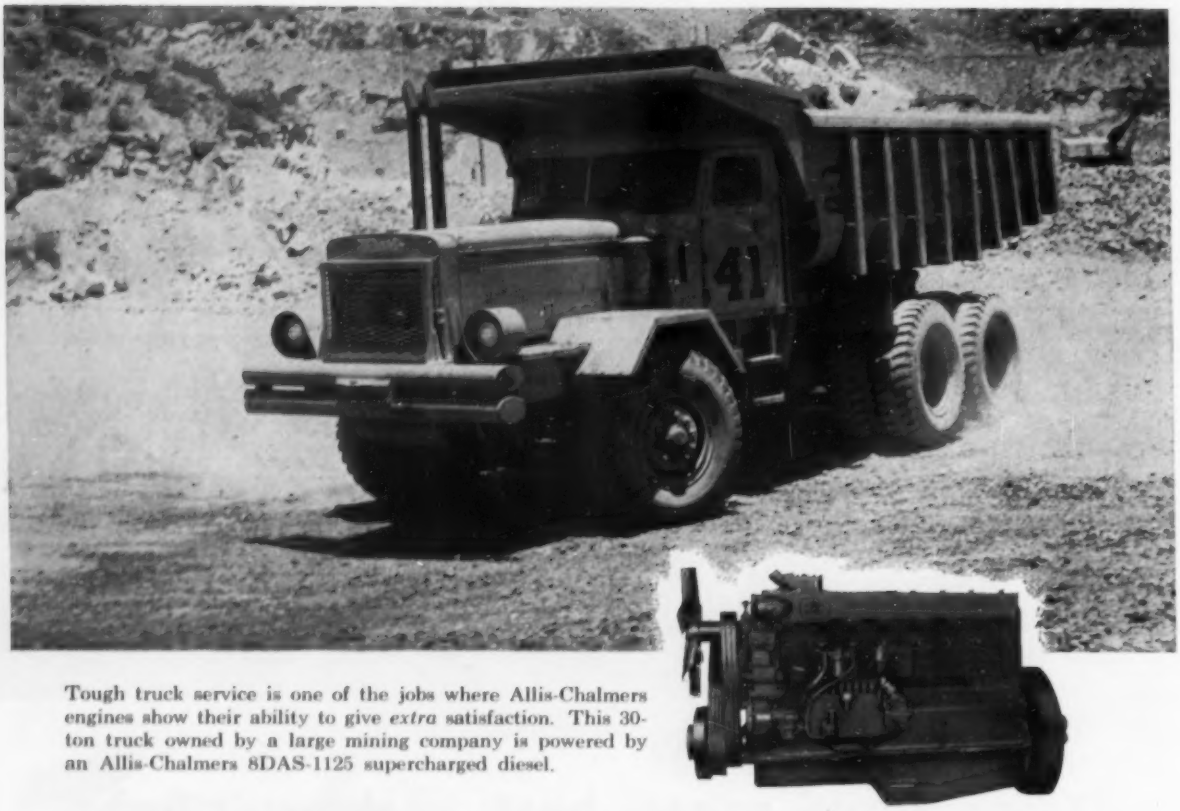
For all mining work—depend on Tiger Brand Wire Rope to give longer, more reliable service. And when you want to talk with a specialist on mining rope application—call in a Tiger Brand Field Engineer for expert advice. Do this by contacting your local distributor or write Columbia-Geneva Steel, 120 Montgomey St., San Francisco

USS

USS TIGER BRAND Wire Rope

United States Steel Corporation • Columbia-Geneva Steel Division

UNITED STATES STEEL



Tough truck service is one of the jobs where Allis-Chalmers engines show their ability to give *extra* satisfaction. This 30-ton truck owned by a large mining company is powered by an Allis-Chalmers 8DAS-1125 supercharged diesel.

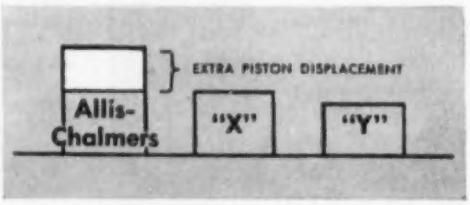
Allis-Chalmers Engines are built to give you more . . . *and they do!*

Whether you need but a few horsepower or several hundred; whether you choose diesel, gasoline, natural gas, butane or propane fuel — you can expect to find an Allis-Chalmers engine to best fit your requirements.

But you can expect more — more usable horsepower, with conservative ratings, high average torque — more time on the job because of rugged construction, ease of servicing — more economical operation, with maximum fuel economy, long service life.

Behind these performance and satisfaction "extras" are many design and construction advantages. For instance, there is longer engine life, less maintenance in the Allis-Chalmers strong, rigid, one-piece block.

Many other features also contribute to long engine life, low maintenance costs — extra-strong, forged crankshafts, big rod-bearing area, oversize piston pins, five-ring pistons for best sealing.



There is also great reserve power in Allis-Chalmers big piston displacement. This means higher usable torque in the normal operating range, lighter engine loading, less strain on the engine.

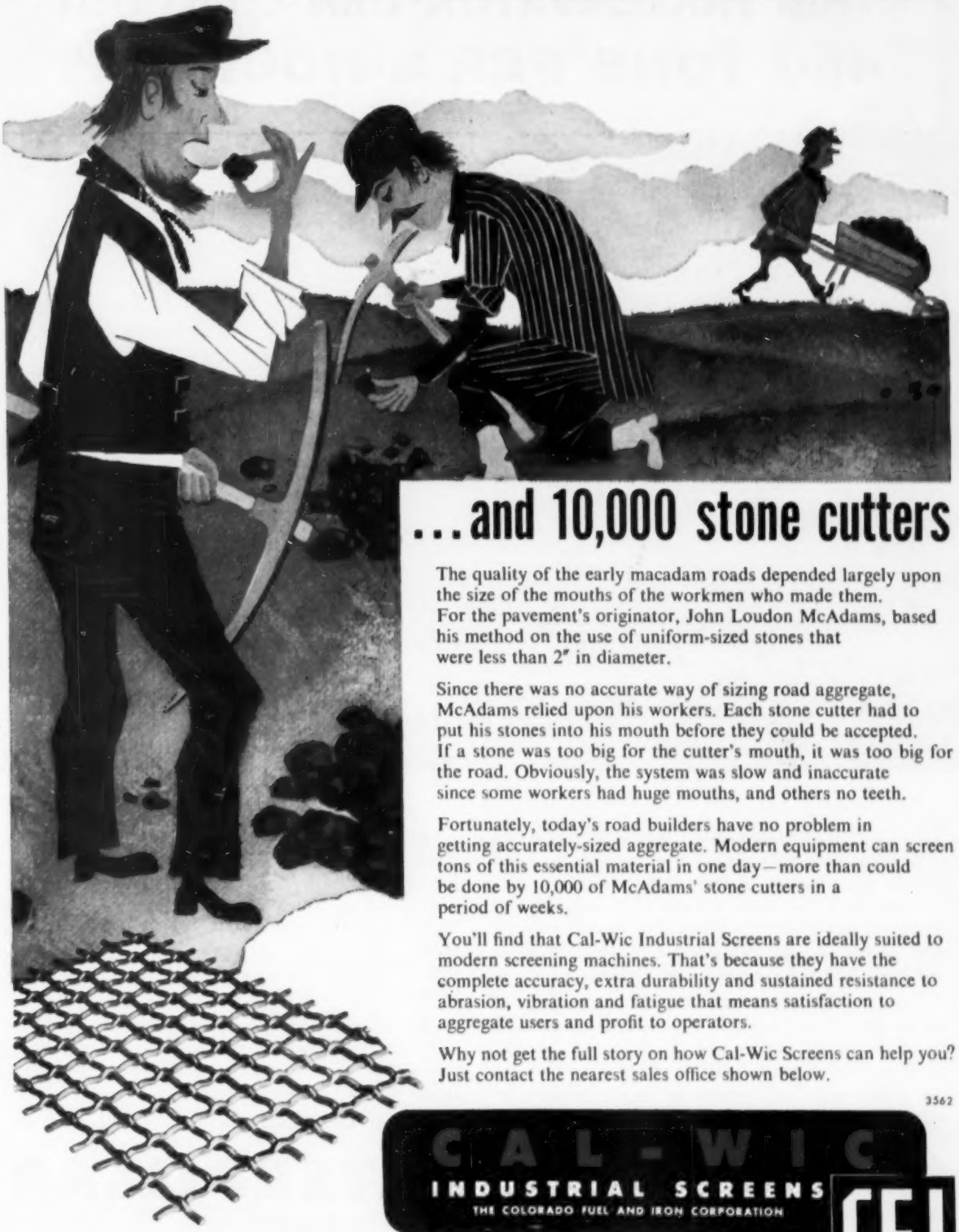
Let your Buda Division, Allis-Chalmers distributor give you the complete story on these economical, dependable engines to fill every power need.

ALLIS-CHALMERS, BUDA DIVISION, MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS

BC-2A

CAL-WIC® INDUSTRIAL SCREENS



...and 10,000 stone cutters

The quality of the early macadam roads depended largely upon the size of the mouths of the workmen who made them. For the pavement's originator, John Loudon McAdams, based his method on the use of uniform-sized stones that were less than 2″ in diameter.

Since there was no accurate way of sizing road aggregate, McAdams relied upon his workers. Each stone cutter had to put his stones into his mouth before they could be accepted. If a stone was too big for the cutter's mouth, it was too big for the road. Obviously, the system was slow and inaccurate since some workers had huge mouths, and others no teeth.

Fortunately, today's road builders have no problem in getting accurately-sized aggregate. Modern equipment can screen tons of this essential material in one day—more than could be done by 10,000 of McAdams' stone cutters in a period of weeks.

You'll find that Cal-Wic Industrial Screens are ideally suited to modern screening machines. That's because they have the complete accuracy, extra durability and sustained resistance to abrasion, vibration and fatigue that means satisfaction to aggregate users and profit to operators.

Why not get the full story on how Cal-Wic Screens can help you? Just contact the nearest sales office shown below.

3562

CAL-WIC
INDUSTRIAL SCREENS
THE COLORADO FUEL AND IRON CORPORATION

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Albuquerque • Amarillo • Billings • Boise • Butte • Casper • Denver • El Paso • Ft. Worth • Houston • Lincoln (Neb.) Los Angeles • Oakland • Oklahoma City • Phoenix • Portland • Pueblo • Salt Lake City • San Antonio • San Francisco Seattle • Spokane • Wichita • **CANADIAN REPRESENTATIVES AT:** Calgary • Edmonton • Montreal • Vancouver

THIS TRAXCAVATOR* CAN LOAD OUT 450 TONS PER 8-HOUR DAY

THIS CAT* HT4 Traxcavator averages 350 to 450 tons of lead-zinc ore per 8-hour day, working 300 feet underground in a mine at Picher, Okla. It is one of 7 Traxcavators owned by American Zinc-Lead and Smelting Co. on the job. All the machines are equipped with air starters, and with exhaust scrubbers designed and built by head mechanic Bob Boyes.

Now there is a new line of Traxcavators, built to handle even more material at even lower cost. The No. 933 (1-yard bucket and 50 HP), the No. 955 (1½-yard bucket and 70 HP) and the No. 977 (2¼-yard bucket and 100 HP) comprise the new Caterpillar-built Traxcavator line.

These 3 new Traxcavators are compact, maneuverable and easy-handling. Their clean exhaust—thanks to efficient and trouble-free Caterpillar fuel injection—makes scrubbers practical for underground work. In all 3 of the machines, weight, horsepower and bucket capacity are perfectly balanced to give top efficiency and economy.

All 3 have these advanced Caterpillar features: 40-degree bucket tip-back at ground level for more leverage, less spillage. Extra-strong box section bucket arms stand up under heavy loads and shocks. Long-lasting oil clutch, which seldom needs adjustment and stands up to roughest duty. Conveniently placed controls and "built-in" operator comfort mean more production with less effort.

There's a Caterpillar-built Traxcavator, with choice of buckets and attachments to increase versatility, that will cut costs in *your* mine. Ask your Caterpillar Dealer for full details today.

Caterpillar Tractor Co., San Francisco, Cal.; Peoria, Ill., U.S.A.

CATERPILLAR*

*Caterpillar, Cat and Traxcavator are Registered Trademarks

NAME THE DATE... YOUR DEALER WILL DEMONSTRATE

Drifts and Crosscuts

Industry Leaders Collaborate To Pick Blue Ribbon Winners

BLUE RIBBON equipment developments of 1955, deemed by the judges as comprising the greatest contribution to the technology of the minerals industry, were picked March 8 by this panel of mining and metallurgical experts. The awards were originated by MINING WORLD a year ago, and are announced in the Annual Catalog, Survey and Directory Number published in mid-April. Panel members pictured while making their final selections from entries made by manufacturers throughout the country and abroad are, from the left: Allen Christensen, president, Utah Construction Company; W. Spencer Reid, general manager, Selby smelter, American Smelting & Refining Company; E. H. Wisser, partner, Wisser and Cox, consulting geologists; George O. Argall, Jr., editor, MINING WORLD; Donald H. McLaughlin, president, Homestake Mining Company; Gordon I. Gould, president, Gordon I. Gould Company; J. Perry Yates, senior vice president, Bechtel Corporation; and Stanley H. Dayton, associate editor, MINING WORLD. Most significant new product developments were nominated by mining, metallurgical, and general equipment manufacturers. Blue Ribbon awards are offered to equipment in the following categories: exploration; underground mining; open pit mining; ore treatment; laboratory and control equipment; general mine, mill and smelter equipment and supplies. Award winners with a picture of the winning equipment items will be featured in the forthcoming annual Directory Issue.

Mining and Automobiles

There's a lot more to mining and automobiles than you might think. Hardrock miners, notoriously good spenders, always drive late model cars, and very often the prosperity of a mining camp is measured by the number of new cars. But, do the miners realize the importance of automobiles in making jobs for them.

On a recent business trip to the east, a general discussion of the mining industry was underway with some leading iron ore producers. The question was asked as to what were the iron mining prospects for 1956. The immediate reply was "Tell me what Harlow Curtice's (president of General Motors Corporation) prediction is for the number of new cars to be made in 1956 and I can tell you what iron ore mining will be." Sound advice because the automobile industry is the largest user of steel, and the record breaking output of cars means record breaking construction of highways, steel bridges, and steel-using garages just to get a place to drive and park the cars.

Mr. Curtice has since made two estimates of 1956 car output. The first, described as preliminary, was on 27 December 1955 and estimated a 12 percent drop from 1955 production to 7,060,000 automobiles. On January 16 he forecast 8,350,000 cars and trucks will be made in the United States and Canada, a drop from the 9,641,000 in 1955. Other estimates have been 6,800,000, and from 6,500,000 to 7,000,000 cars.

Here's why. For zinc the average car will use 10 to 15 percent more zinc than that for 1955 when each car consumed an average of 50 pounds of metal. This is largely used in die casting of grills, carburetors, tail light assemblies etc. For aluminum the picture is even brighter with 35.2 pounds used per car in 1956, with an expected rise to 49.8 in 1960, and 81 in 1965. Total use in 1956 will be about 123,000 tons.

Each new car requires about 1.88 tons of steel to build. This means about 2.0 tons of iron ore must be mined to make this steel.

Lead use per car is up too, largely due to the larger 12-volt batteries now standard on many cars.

It all adds up to one thing. Automobiles are the miner's best friend.

new, improved

PAYLOADER®

tractor-shovel

model HO

2¼ cu. yd. CAPACITY

7,500 lbs. @ 4 mph

Bigger Capacity–Better Performance

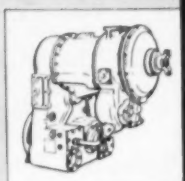
This new 1956 model HO has a bucket capacity of 2¼ cu. yd. payload, 1¾ cu. yd. struck . . . is the biggest capacity "PAYLOADER" ever offered, and outstanding by any measure. Pound for pound, it's way ahead of the field in digging power and carrying capacity. The famed Hough bucket motion has powerful pryout action and 40° tip-back at ground level to *get* big loads and *hold* big loads without spilling.

It has power brakes, power steer and power shift . . . is more maneuverable . . . faster and easier operating and easier riding — with or without a load. It delivers better, more reliable traction over a wider range of ground conditions than any wheeled tractor-shovel *ever* has. It has balanced design and durability *throughout* to deliver big yardage day after day without interruption.

If you want the last word in a big husky tractor-shovel, insist on a model HO. Your "PAYLOADER" Distributor has all the facts.

Complete Power-Shift Transmission

The fastest and easiest-operating transmission ever built. All shifts can be made instantly, on-the-go, under full engine speed. There's no stopping for a RANGE shift, there's no foot clutch. With the forward-reverse control the operator can "creep" the machine at full engine speed, in any gear, while maintaining full bucket action . . . all this plus torque converter drive.



Planetary Final Drives

Rugged planetary final drives in the wheel hubs, plus hypoid differential gearing, keep torque low in axles . . . prolong life of axles and all drive train parts. Torque-proportioning differentials assure effective traction under slipping conditions. If one wheel starts to slip more power is delivered to the opposite wheel.

PAYLOADER®

MANUFACTURED BY

THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.

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THE FRANK G. HOUGH CO.

859 Sunnyside Ave., Libertyville, Ill.

Send full information on "PAYLOADER" 4-wheel-drive tractor-shovels.

☐ model HO—2¼ cu. yd. ☐ model HH—1½ cu. yd.

☐ model HU—1 cu. yd.

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Capitol Concentrates

Resolution Asks Congress To Pass Bill For A Sound National Mineral Policy

One of the most interesting bills to be introduced in the Congress in a number of years is S. J. Res. 148, a Senate-House joint resolution "expressing the sense of the Congress with respect to a sound national minerals policy, and directing the Secretary of the Interior to take certain action in furtherance of such policy."

The bill was introduced at the instance of the Western Governors Mining Advisory Council which, at the request of the Arizona delegation, passed a resolution asking the Congress of the United States to declare a national minerals policy and to implement its declaration of policy with appropriate legislation. As the passage of S. J. Res. 148 will cost nothing, and there is nothing in it that the domestic minerals producers or their Congressional representatives could oppose, the resolution is believed to have a good chance of passing—especially since the Congressmen are disappointed with the vague policy statements which have emanated from the President's Mineral Policy Committee.

Not since the Roosevelt mineral policy of 1943, evolved at the request of Senator Murray of Montana, has there been a statement of mineral policy satisfactory to the domestic mining industry. This may be it.

The resolution is nonpartisan, being sponsored by Senators Murray, Anderson, Barrett, Bible, Goldwater, Hayden, Malone, Mansfield, and Scott, together with Representative Rhodes of Arizona in the House. It instructs the Secretary of the Interior to submit to the Congress his recommendations for legislation which will insure the United States of a minerals industry, "both of the common minerals and metals and those classified as strategic and critical," having the capacity to operate on a sound economic basis regardless of the price of foreign minerals and metals. His recommendation is to be made within a year after the bill becomes law.

This resolution, of course, is a bill for drafting comprehensive, long-range legislation and must not be confused with bills to extend the so-called mineral purchase programs which are designed to keep the mines running which were opened under the ODM-GSA strategic mineral purchase regulations. Information from Washington indicates there will be a strong movement to pass legislation, before this session of the Congress ends, to continue these programs.

• Aid Proposed For Lead-Zinc Mines

A bill has been introduced by Senator Carlson of Kansas (S. 3173) to encourage the operation of marginal lead and zinc mines. The bill merely is permissive and probably gives no authority that the director of the Office of Defense Mobilization does not already have, except that it permits the purchase of ores rather than metal, and at such prices as will "assure the operation of such mine at a reasonable profit." It is difficult to imagine Director Flemming's voluntarily carrying out the purposes of the bill.

• Silver Transactions Tax Brings Low Return

A lot of fuss was created by the proposed repeal of the Silver Purchase Act (which repeal would injure the domestic mining industry sorely), but it is several years since anyone has proposed the separate repeal of the 50 percent tax on the profits on the transfer of any interest in silver bullion when the transfer price exceeds the cost plus expenses. It seemed highly likely that the removal of this tax would improve the position of silver in this country. In fact, it has been estimated in the past that if the tax were repealed, and the way thus cleared for trading in silver futures, the open-market silver price would go above $1.00 an ounce. This should make the Treasury happy as it would not have tenders of silver at the higher price.

The tax undoubtedly was imposed to harass the silver traders rather than for revenue purposes. This is shown by the fact that from 1934, the year the tax became effective ($1.00 was collected in that year), to and including 1955, the sum total of collections was but $6,248.00! Handy and Harmon, the silver brokers, once remarked, "Ever since the 50 percent tax provision in the Silver Purchase Act had become known, trading on the Commodity Exchange had dwindled, and the suspension of these operations on August 9, 1934, marked the elimination of New York as a world trading center and the transference of such activities to foreign markets." London, of course, benefited immensely.

Obviously, the Silver Transactions Tax stopped all speculation in silver futures in this country. As the object of speculation and futures trading is to make money and some authorities seem to be of the opinion that New York might well become the world silver market should the tax be repealed, it seems likely that such trading might improve materially the market situation of silver. However, this, in turn, might cause an outflow of silver from the Treasury if the 91 cents per ounce Treasury sales price continued, according to other experts, and thus check speculation. It is possible that to achieve free trading in silver, other parts of the law might have to be changed at the same time.

• Inspection of Metallic Mines Proposed

The mining industry in general probably will not appreciate the series of bills of which H. R. 9269 by Representative Blatnik is an example. This bill is titled: "Relating to certain inspections and investigations in metallic and nonmetallic mines and quarries

..EFFICIENT, LOW COST INDUSTRIAL POWER CONVERSION

IN A WIDE RANGE OF CAPACITIES

SYNTRON

a-c to d-c POWER CONVERSION UNITS

Providing automatic, low cost a-c to d-c conversion for industrial requirements. Syntron Power Conversion units provide complete current conversion in one compact package. Available in capacities from 125 to 550-volt a-c to d-c, they have no moving parts to be serviced—require no warmup period—equipped with Syntron's quality Selenium Rectifiers.

SHAFT SEALS

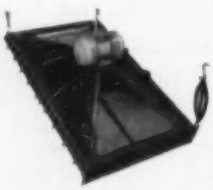
Positive sealing of liquids or gases around rotating shafts of pumps, compressors, etc. Self-lubricating—will not cut or score shaft.

VIBRATORY FEEDERS

For controlled feeding of bulk materials from fine powders to coarse, heavy lumps.

SINEX SCREEN

Sinex Vibrating Screens provide high speed, uniform sizing and dewatering. Single or double deck, suspension type.



SYNTRON COMPANY
166 Lexington Ave. Homer City, Penna.

(excluding coal and lignite mines) for the purpose of obtaining information relating to health and safety conditions, accidents, and occupational diseases therein and for other purposes." If anyone refuses to let a government inspector on his premises he may be subject to a fine of $500 and/or 60 days in jail.

There is no doubt that the sponsors of this measure are well-meaning but, unless the movement is checked, it will mean eventually that metallic and nonmetallic mines and quarries will be subjected to restrictive legislation which unquestionably will result from this inspection bill.

- **Figures Don't Lie, But . . .**

The way statistics may be warped and used to suit the occasion was well illustrated by Senator Williams of Delaware during the last session of Congress when the Senate debated S. 6373, the mineral purchase extension bill. He made it look as though the Office of Defense Mobilization programs, as extended by the Aspinall-Malone Act, had resulted in a loss to the Treasury of $750,000,000.

This was, of course, the usual nonsense and was predicated upon the fact that: (1) a bonus was paid for production; and (2) the idea that because much of the material is not quite up to stockpile specifications it is valueless. As any sensible person knows, this approach was very wide of the truth and nearly all of the material would be used by industry thankfully during an emergency—and at as high or higher prices than have been paid. In fact, it would be interesting to know the net profit to the United States if one considered the present value of the stockpile inventories accumulated over the past 15 or 20 years.

The GSA has stated to the House Appropriations Committee that the strategic minerals purchase program—if not extended—will cost $307,500,000 million and the loss (based on present market prices) will be $163,800,000. The "loss" not only depends on the market prices at the time the estimate is made, but discounts entirely the incalculable value the materials would have should we be trapped by an emergency.

COMING CONVENTIONS

April 23, 24, and 25. Joint meeting of AMERICAN ZINC INSTITUTE and the LEAD INDUSTRIES ASSOCIATION, Statler Hotel, St. Louis, Missouri.

April 23 through 25, 1956. Colorado School of Mines SYMPOSIUM ON ROCK MECHANICS, Golden, Colorado.

May 3 through 5. Pacific Northwest Regional METALS AND MINERALS CONFERENCE sponsored by the AIME. Olympic Hotel, Seattle, Washington.

May 10 and 11. Two-day MINING CONGRESS ON SIGNIFICANCE OF ATOMIC ENERGY sponsored by Southwest Research Institute and Atomic Industrial Forum. San Antonio, Texas.

May 10 through 13. NATIONAL OIL AND URANIUM EXPOSITION featuring machinery exhibits and mechanical devices. Texas State Fair Grounds, Dallas, Texas.

May 11, 12. INSTITUTE ON LAKE SUPERIOR GEOLOGY sponsored by the Michigan Geological Survey and the Exploration Subsection of the Upper Peninsula Section of the AIME. Michigan College of Mining and Technology.

May 16 through 18. Annual meeting of the PERLITE INSTITUTE, Ponte Vedra Beach, Florida.

June 7 to 9, 1956. THIRD INTERNATIONAL LIGHT METALS CONVENTION, Montanistische Hochschule, Leoben, Austria.

June 25 through 29. Annual Meeting AMERICAN SOCIETY FOR ENGINEERING EDUCATION, Iowa State College, Ames, Iowa.

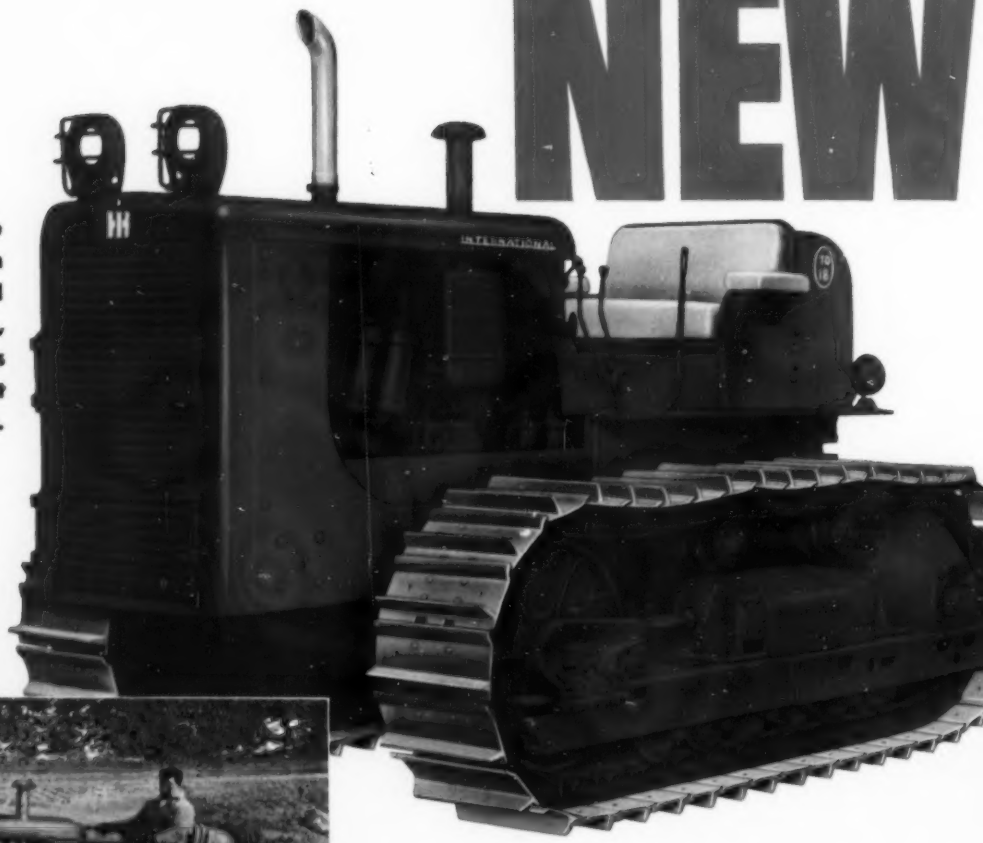
June 28, 29, 30, and July 1. NATIONAL OIL AND URANIUM EXHIBITS featuring machinery exhibits and mechanical devices. The 48th District Agricultural Association Building, Santa Ana Freeway and Eastern Avenue, Los Angeles, California.

NEW...

Bonus Powered too!

NEW

124 Net Engine Horsepower. In International Drott Machines, Engine develops 134 Net Horsepower.



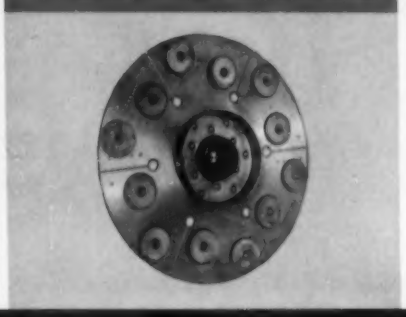
182 Series

TD 18

TD-18 diesel (series 182) delivers 103 drawbar horsepower, with weight of 29,050 pounds (without equipment). All-weather electric starting, standard equipment. "New look" visibility, operating ease never before available. New heavy-duty, swinging-door type radiator guard is "standard"—for carrying heavy front-mounted equipment. Gives big tractor performance in pioneering under roughest conditions. Powers 3-yard International Drott Skid-Shovel, anywhere.

No costly delay from a "killed" or cold engine—you start fast! Famous International *gasoline-conversion* diesel starting—*actual* "in-seat" starting—is *standard equipment* on this new crawler line. With "push-button" ease, you get seconds-fast starting, whether the engine is cold, or stopped! And you're on the job seconds-fast, when minutes are dollars.

Cerametallic Engine Clutch Facings Save power, defy heat, prolong life! Uncomplicated, *familiar-to-all* engine clutch design of these new crawlers have *power-holding, heat-defying, long-lasting* Cerametallic facings. These facings reduce lever-pull up to 50%, provide amazing heat immunity, add service freedom, cut upkeep!



New . . . 500-hour lube intervals wi new metal-to-metal, track roller seal You save the time and expense of fr quent inspections or lubrications, with t new *full-floating*, cartridge-type, tra roller seals provided on the TD-24, TD-1 and TD-14. These precision-lappe metal-to-metal seals are so effective th give you *safe* 500-hour intervals betwe roller lubrications!

Steps up a size... in job range and capacity!

50 Net Engine Horsepower. In International Drott Machines, Engine develops 55 Net Horsepower.

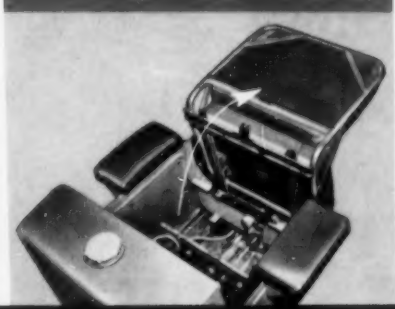
61 Series

TD 6

TD-6 diesel (series 61), 41.5 drawbar hp, up 23%! Steps up a whole size in work capacity and earning ability. Operating weight (5-roller model), without equipment, 8,890 pounds. Powers 1-yard International Drott Skid-Shovel or Four-In-One; serves as clean-up dozer unit on any-sized contract; versatility and low operating cost to do many sizes of jobs for every size of contractor.

Full-view, one-glance panel saves time—cuts effort! One quick glance at this new full-view panel, with centralized instrument grouping, gives the operator the instant check-up, to assure that lubrication, generator, and cooling system are "perking" for full production!

New Fold-over Seat Aids Fast, Centralized Servicing! New fold-over seat of the TD-6 and TD-9 models allows operator to give you the time and convenience advantages of centralized steering clutch assembly servicing. Lubricant fittings are conveniently grouped and fully accessible!



Thorough air filtration assured by new under-hood cleaner! Instead of being "in your lap," or a knee-bumping obstruction, air cleaners of the new International crawlers are side-mounted—for easy accessibility, yet out of the way. They have big capacity and high efficiency, too, for positive air filtration!

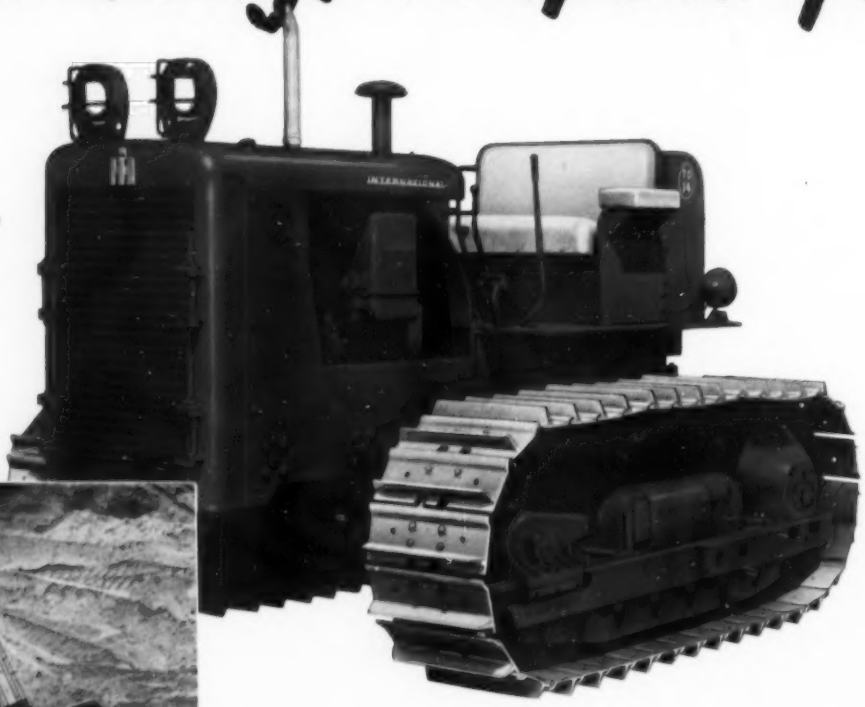
International® Crawlers gi

plus new design to speed yo

95 Net Engine Horsepower.

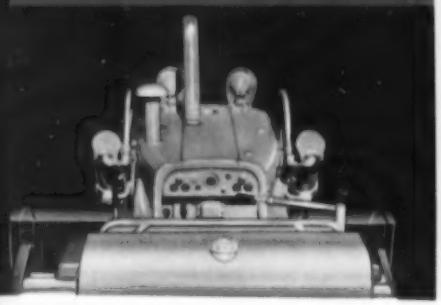
142 Series

TD 14

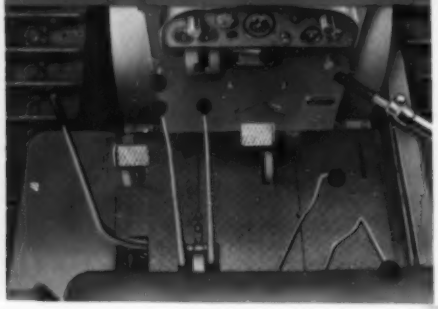


TD-14 (series 142), 78.5 drawbar hp; weighs 21,095 pounds (without equipment). Features "new look" engineering, job-speeding visibility, new equipment-carrying and operating strength. All-weather electric starting, standard equipment. It's a fast, responsive, big-capacity dozing tractor. Powers 2¼ cu. yd. International Drott Skid-Shovel or Four-In-One; 15-ton capacity Superior Pipe-Boom; other similar-sized equipment.

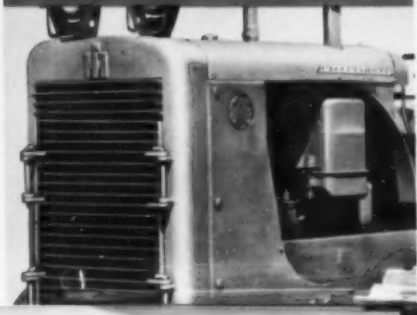
Control Tower Visibility adds operating efficiency! See how new International crawlers are streamlined for complete job-control visibility. Seat is amply high to provide full view of equipment, terrain, and variations requiring operator action, to maintain efficiency.



Clean, safe deck steered for action! Look down on that safe, clean, flush deck—a platform for full production. The wide, man-size seat is fully-adjustable; foam rubber padded. Instruments centralized for one-glance check-up! Even a cigarette lighter is provided, to prevent needless stops!



Pressurized Closed Cooling System for Positive Performance Protection! New pressurized cooling systems provide fast warm-up under thermostatic control—and positive *ideal temperature control* with forced circulation through full-length jackets. That aids clean combustion, guards oil film strength, protects performance. Radiator core assembly is easily-removable, without disturbing radiator guard or mounted equipment.



ive you Bonus horsepower—
our jobs, control your costs!

66 Net Engine Horsepower. In International Drott Machines, Engine develops 71 Net Horsepower.

91 Series

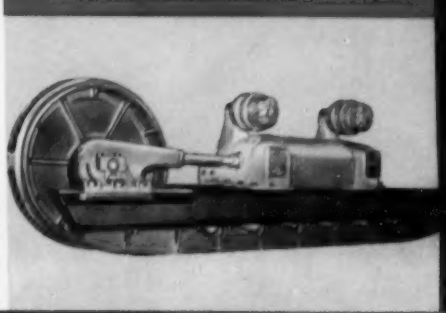
TD 9

TD-9 diesel, (series 91), delivers 54.5 drawbar hp—up 32%. Operating weight (5-roller model), without equipment, 12,000 pounds. Now up in a new heavy-duty job range. New power is backed by new power train and track frame strength, new operating and servicing ease. Powers International Drott 1½ cu. yd. Skid-Shovel and other equipment requiring similar power.

480-hr. full-flow lube oil filters guard bearings, cut upkeep! Every drop of oil on its way to lubricate moving engine parts must pass through these new abrasive-trapping micron-type filters—with the capacity, strength, and efficiency to give 480 hours of wear-fighting, upkeep-cutting duty!

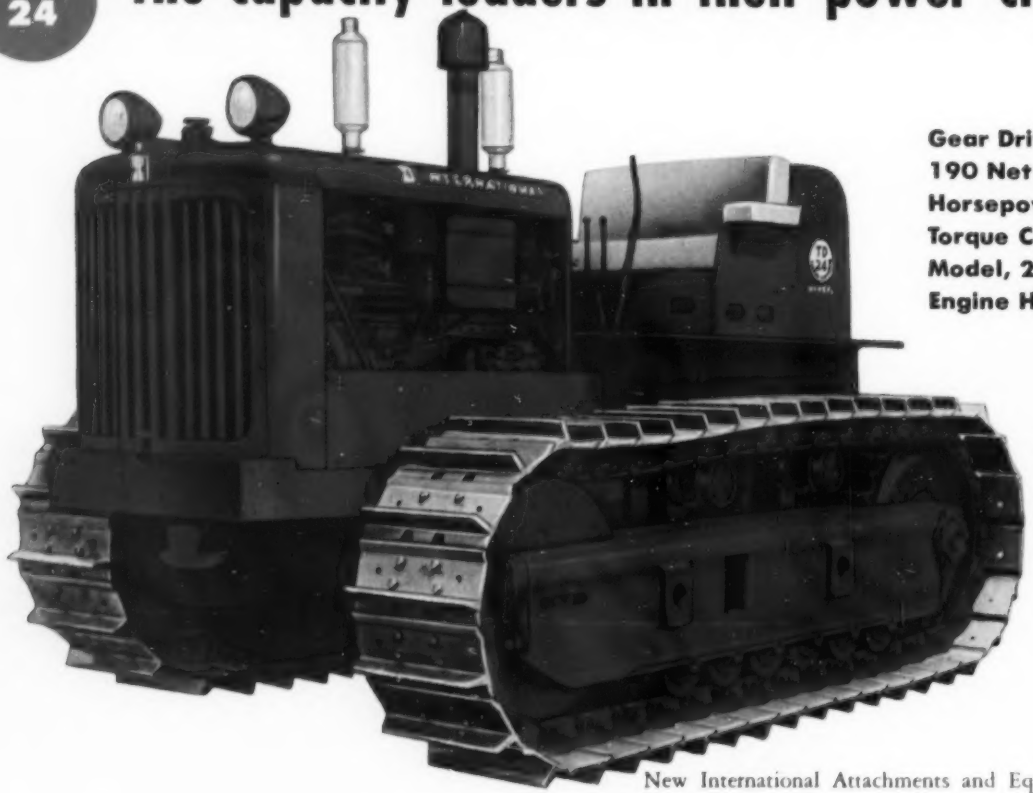
Hydraulic Power Steering Inspires Operator Cooperation! New hydraulic power steering of the TD-14 and TD-18 cuts operator fatigue—and along with the other big effort-saving advantages, makes it easier than ever to deliver full-capacity production! TD-6 and TD-9 have spring boosters to lighten the operator's job.

"Bridge-strong" track frames for "slam-bang" conditions! You are looking at the strongest track frame in the industry for crawlers of TD-18 and TD-14 size! Heavy steel box-section beams, weld-joined to heavy stress-relieved steel plates—and rigidly gusset-braced—they're your foundations for record-making "rough-and-tumble" performance!



TD 24

The capacity leaders in their power class



Gear Drive Model, 190 Net Engine Horsepower
Torque Converter Model, 200 Net Engine Horsepower

Massive—with 43,080 pounds of rock-dozing, scraper-pushing brawn (7-roller torque converter model)*—the TD-24 can give them all a lesson in operating ease, big capacity, and positive load control! Has instant high-low range and exclusive Planet Power steering to give you its tremendous *pushing*, *pulling*, and *lifting* power on any terrain—with responsiveness not available elsewhere! *Live power on both tracks, on every turn!* Backed by equipment engineered to match its strength and power!

*Gear Drive 7-roller model weighs 42,780.

New International Attachments and Equipment team with new bonus-powered crawlers to give you high-producing performance packages: 42 new Bulldozers, to fit your needs exactly . . . 4 new Drott Loaders, 1 to 3-cubic yard capacity . . . 4 new Superior® Pipe-Booms, 8 to 55-ton capacity; 3 job-proved PCU'S! . . . **Measure . . . compare . . . prove to yourself . . . new bonus-powered International crawler tractors beat anything else on tracks! Try this turnpike-paced new power for capacity, operator preference, profit potential. Ask your International Industrial Power Distributor for a bonus-powered demonstration *to your specifications!***

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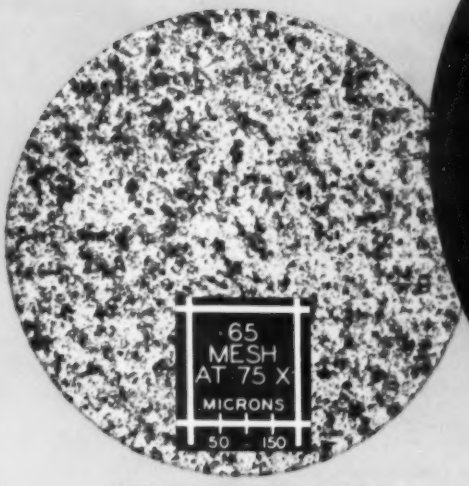
International Industrial Power

INTERNATIONAL HARVESTER COMPANY, 180 N. Michigan Ave., Chicago 1, Illinois

A COMPLETE POWER PACKAGE INCLUDING: Crawler, Wheel, and Pipe-Boom Tractors . . . Self-Propelled Scrapers and Bottom-Dumps . . . Tractor and Rubber-tired Loaders . . . Diesel and Carbureted Engines . . . Motor Trucks.



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Now - a choice of

3 AEROFLOC Reagents

to Improve Filtration and Settling by Powerful Flocculation at any pH

AFTER ADDING AEROFLOC REAGENTS

Study the photomicrographs above. Note how the addition of only 0.01 to 0.1 lb. per ton (0.1 to 5 ppm in dilute suspensions) of AEROFLOC Reagent flocculated the finely divided solids. Visualize how such powerful flocculation can improve filtration and settling at your mill.

In settling operations AEROFLOC Reagents speed up and effect more complete settling of both valuable concentrates and plant tailings or leach residues, thereby conserving values previously lost to thickener overflow or reducing solids content of plant effluents.

As a filter aid in operating plants, AEROFLOC Reagents increase filtration rates, make filter cakes firmer and more porous, help prevent blinding of filter cloth and increase washing ease and efficiency. In new and existing plants AEROFLOC Reagents can reduce capital expenditure by increasing the capacity of existing thickening and filtration installations or reducing size of new units required.

Three AEROFLOC Reagents are available—#548, #552 and #3000. The latter is especially recommended for acid pulps, but is also very effective in alkaline systems. But we suggest that you test all three because it is not possible to predict accurately which will perform best in any given application.

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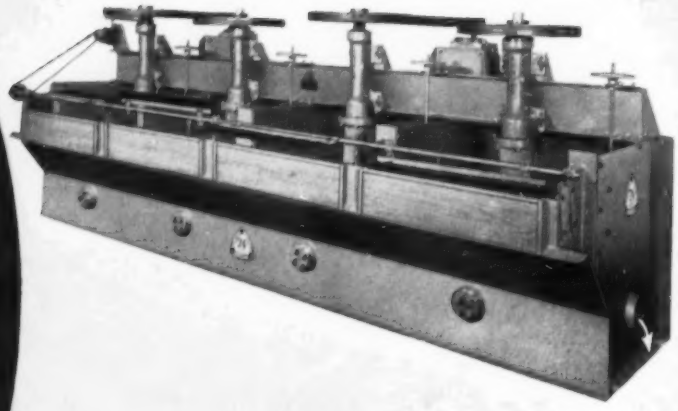
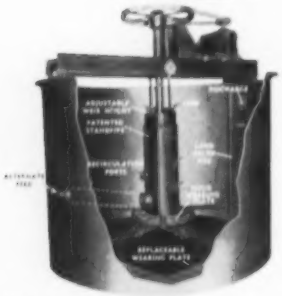
DENVER CAN SUPPLY COMPLETE EQUIPMENT FOR YOUR MILL



Crushers, Screens, Feeders, Ball-Rod Mills, Classifiers, Jigs, Pumps, Samplers, Agitators, Conditioners, Flotation, Thickeners, Filters, Dryers, Ore Testing and Mill Design Services.



DENVER (patented) SUPER-AGITATOR AND CONDITIONER

- Patented standpipe gives controlled recirculation.
- All feed passes through propeller zone for complete conditioning . . . no short circuiting.
- Recirculation prevents build-up of froth on surface.
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- Sizes 3' x 3' to 20' x 20'.

For complete information, WRITE FOR BULLETIN NO. A2-B4.

HERE'S WHY DENVER "SUB-A" LEADS THE WORLD IN ECONOMIC METALLURGY

FLOTATION EFFICIENCY cannot be based on any single feature. Low tailings, clean concentrates, low horsepower, long part life, continuous operation, coarse feed, initial and operating costs and space required must be balanced to produce the greatest NET PROFIT FOR YOU.

Deco's "know-how" in flotation engineering is unequaled. The Denver "Sub-A" can be adapted to meet milling conditions instead of adapting your plant to meet limitations of the machine. These features of mechanical flexibility which your mill man needs to gain ECONOMIC METALLURGY are illustrated in Deco Bulletin F10-B81—sent on request.

Case histories of Denver "Sub-A" Flotation in problems similar to yours will be sent on request. Flotation tests and flow sheet design services are available. Consultation is without obligation. Write today. Use our experience to help increase your FLOTATION PROFITS.

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Mining World

THE IMPORTANT MINING MAGAZINE EVERYWHERE

April 1956

INTERNATIONAL PANORAMA

MOAB, UTAH—Homestake Mining Company's uranium mining subsidiaries earned $449,000 before depletion in 1955. Homestake's uranium costs have been $2,363,000 and $1,934,000 of this has been returned to the company.

DILLWYN, VIRGINIA—Copper-lead-zinc prospecting is underway on the Virginia Mining Company's properties near here by Exploration Projects, Inc. formed by American Metal Company, Ltd., Consolidated Coppermines Company, and Canadian mining interests.

PREWITT, NEW MEXICO—Haystack Mountain Development Company, important uranium producer, has paid its first dividend—$500,000—to its parent company, Atchison, Topeka & Santa Fe Railway Company.

SANTIAGO, CHILE—Anaconda Company's subsidiary, Andes Copper Mining Company, has started work toward bringing its Indio Muerto claims into production. Drilling to date indicates 78,000,000 tons of 1.6 percent ore. It will take four years for first production.

CRESTED BUTTE, COLORADO—American Smelting and Refining Company has signed a contract with DMEA for a $107,220 exploration program at its Keystone zinc-lead-silver mine here.

AIKEN, SOUTH CAROLINA—A new firm, Heavy Minerals Company, has been formed by the Crane Company, Vitro Corporation of America, and the French firm, Societe de Produits Chimiques des Terres Rares. Heavy Minerals will produce thorium, rare earths, and other minerals from placer sands.

PORT MACQUARIE, AUSTRALIA—Mineral Deposits Proprietary, Ltd., a new subsidiary of National Lead Company, will build a new £A500,000 rutile beach sand mining and concentrating plant here.

EDGEMONT, SOUTH DAKOTA—The Chicago and North Shore Railroad has purchased all stock of Mines Development, Inc. which is building a uranium mill here under AEC contract to treat Black Hills area ores.

MONTREAL, CANADA—Jones & Laughlin Steel Corporation has signed a contract to explore low-grade hematite-magnetite deposits 190 miles north of Seven Islands, Quebec. The contract was with claim owner—Quebec Cobalt & Exploration Ltd.

MADRID, SPAIN—A new zinc smelter and electrolytic zinc plant will be constructed by Minera Celdran S. A. Eventual planned capacity will be 20,000 annual tons of electrolytic zinc.

GRANTS, NEW MEXICO—Rio de Oro Uranium Mines, Inc. has entered a partnership agreement with Foley Brothers, Inc. to negotiate a mill contract with the Atomic Energy Commission. Ore will come from Rio de Oro mine and Foley will build the mill. Foley is financially interested in and is building the Uranium Reduction Company mill at Moab, Utah.

BABBITT, MINNESOTA—Reserve Mining Company's Babbitt taconite mine and coarse crushing plant has reached rated capacity—42,000 tons per day. Improvements are continuing so that this production rate will be maintained on an every day of the year basis.

TAHAWUS, NEW YORK—National Lead Company is expanding ilmenite mining and concentrating facilities here by 25 percent. Completion is scheduled this year. In 1954 1,355,952 long tons of ore were mined, and 1,288,617 in 1955.

TORONTO, CANADA—Lorado Uranium Mines Limited has received a $44,887,500 uranium concentrate contract from Eldorado Mining and Refining Limited. Lorado is building a 500-ton initial capacity custom mill at Beaverlodge to produce the concentrate.

YOZGAT, TURKEY—The Turkish Institute of Mineral Resources has announced that promising uranium mineralization has been found near here. Prospecting and development are underway.

WASHINGTON, D. C.—The United States Atomic Energy Commission has announced a price of $43.00 per kilogram ($19.50 per pound) for thorium metal used in nuclear reactors. The old "secret" price was $25.00, but the new price is equivalent to total production cost.

Pick Drills Mercury Properties in Nevada

The Pick Uranium Company is drilling the cinnabar properties in the Ivanhoe mining district of Elko County, Nevada which were acquired from Mrs. Alfreda Pangborn and George Dillon last year.

The firm first took a prospecting permit on the property and then completed the purchase later. These properties are the Silver Fox, Silver Cloud, and Butte claims. In addition the company has located a number of protective claims adjacent to these.

Roy E. Taylor of Grand Junction, Colorado is resident manager for the company's operations.

Ancient Roman Mines Are Reopened in Yugoslavia

The lead and zinc outlook for Yugoslavia appears good. The lead production at the two smelters at Trepca and Mezica is steadily rising and exploration and development of additional ore sources continues.

A deposit of good lead-zinc ore has been disclosed at the Sebrenica (Bosnia) mine which was first worked by the Romans and Saxons and just recently reopened. At Kisnica, near Pristina (South Serbia), several million tons of ore containing 2 to 5 percent lead, 1 to 3 percent zinc, and some silver per ton has been opened up; a flotation plant is being erected at the site. It is expected that this deposit will be developed into one of the biggest lead-zinc mines of Yugoslavia.

Cerro de Pasco To Explore Chilean Copper Mine

Cerro de Pasco Corporation will explore the Rio Blanco copper mine near Santiago, Chile under an option agreement with Rio Blanco Copper Corporation of Virginia which, in turn, holds all of the stock of Compania Minera Rio Blanco Ltd., whose mining concessions are in Chile. Cerro de Pasco has proposed purchase of all of the Compania Minera stock either by payment of $2,000,000 in cash, or by payment of $600,000 in cash and the remainder in Cerro de Pasco stock. The option expires on October 1, 1957.

Meantime, Cerro de Pasco will diamond drill a minimum of 9,000 to 10,000 feet from underground stations at the mine. The mine is reported to have about 27,800,000 short tons of proved reserves averaging 2.2 percent copper content, and possible additional reserves of from 50,000,000 to 70,000,000 tons of ore. One great handicap to development is that the region is covered by snow for about seven months of the year, leaving only five workable months during the summer.

Silver Bell – ASARCO Makes a Mine At a Long Known Deposit

FIRST of the two deposits opened by Isbell Construction Co. for ASARCO is the Oxide open pit shown above.

After completing the first full year of operation American Smelting & Refining Company's Silver Bell mine and concentrator 40 miles northwest of Tucson, Arizona have been shaken down to a smooth daily routine. The $17,000,000 project completed in March 1954 brought into production two copper deposits which were partly outlined by drilling as far back as 1910. Today's metallurgical know-how and modern, mass-producing, open-pit mining methods have made possible the rebirth of this once active Arizona mining camp.

As long ago as 1904 the Imperial Copper Company had explored, with 87 drill holes, a copper ore body now within the confines of ASARCO's El Tiro open pit. The Oxide Copper Company, by 1910, had drilled mineralization which is now being mined in ASARCO's Oxide pit. Both deposits were surprisingly well known as to grade and tonnage, but they lay dormant, awaiting the march of technology, because the copper content was far too low to be handled profitably at the time.

ASARCO first acquired the property of the old Imperial Copper Company in 1915 and has been gradually consolidating holdings in the area ever since. In 1948 American Smelting and Refining began additional exploration work and started a check drilling program. The proven reserves in ASARCO's two open pits amounted to 32,000,000 tons of 0.9 percent copper ore when operations were started. At the present daily rate of 7,500 tons, this gives a projected life of 12 years to the operation.

Company Financed Project

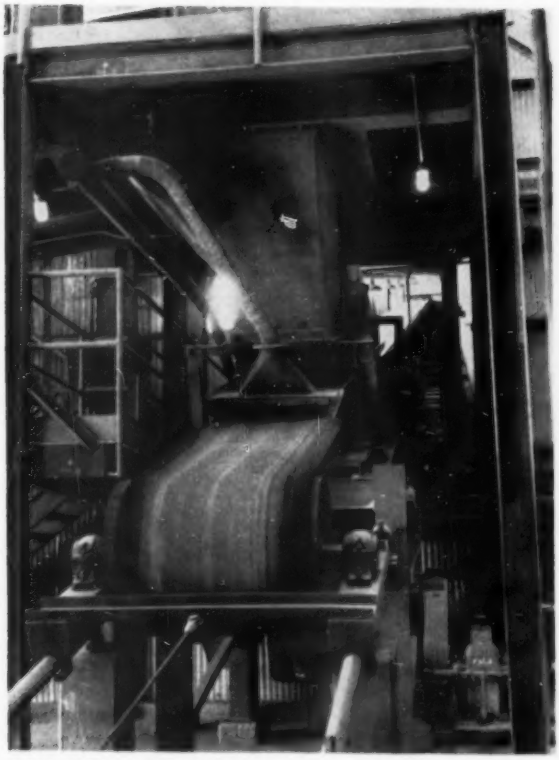
In the early stages of the Korean War when copper was in short supply ASARCO negotiated a floor price contract with the government guaranteeing 24½ cents a pound for a portion of the copper in their Silver Bell holdings. ASARCO then went ahead to provide the financing necessary to place the properties in production. Isbell Construction Company of Reno, Nevada, was awarded a stripping and mining contract. Stearns-Roger Manufacturing Company, Denver, Colorado, received the contract for building the concentrator; the Utah Construction Company prepared and constructed the townsite.

Well Planned Mill

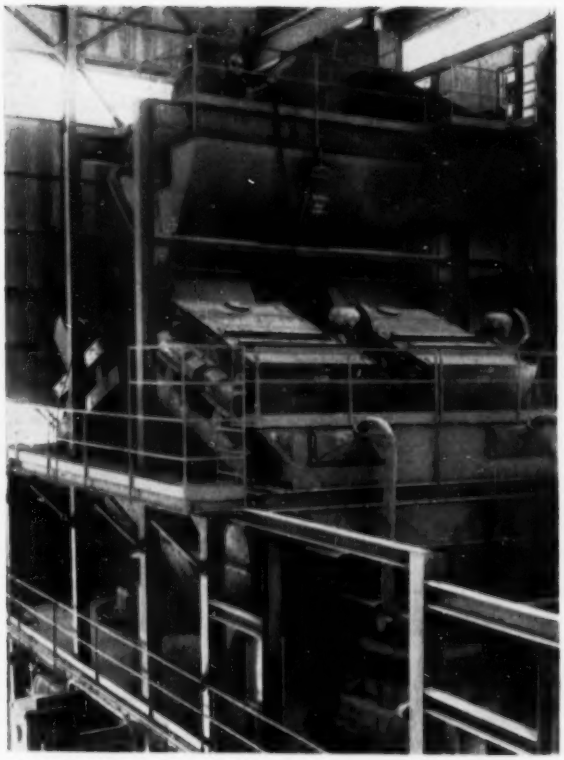
The 7,500-ton mill is an outstanding engineering accomplishment. Savings in labor costs have resulted because considerable forethought and planning were given to the physical arrangement and layout of machinery. All crushers are located in one building which simplifies maintenance, supervision, and control of ore preparation activities. Motor drives and takeups for most of the conveyors are housed in a single structure. The conveyors and crushers are electrically interlocked, so that a breakdown in crushing or conveying will automatically halt the flow to that point. Numerous drains and sumps have been provided to collect pulp spillages for return to the mill circuit. Alarm systems on the crusher indicate failure of lubricating systems, and after a short time lag will shut the faulty unit down. Flotation cells are installed in one floor, eliminating stair climbing for operators. Mill middling products are treated as a separate product in scavenger flotation cells rather than being recycled back to the main circuit as is so commonly done today. These are a few of the many oustanding features which characterize the Silver Bell mill.

Geology

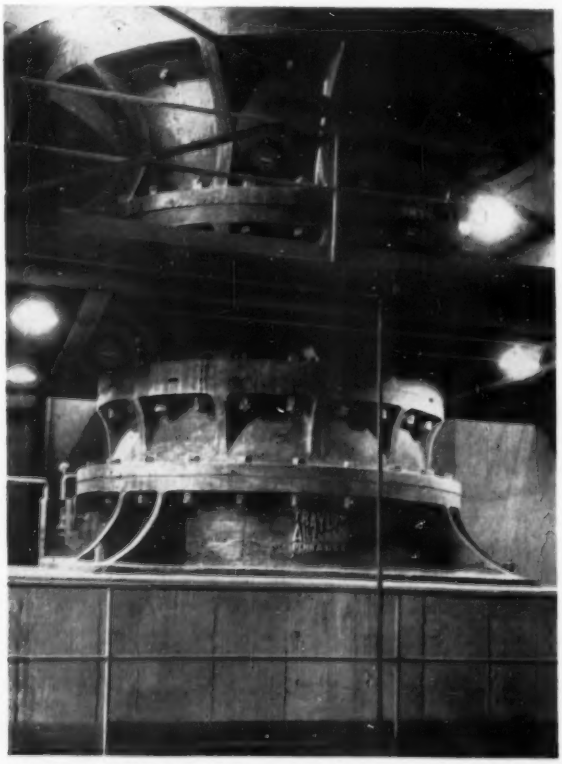
The ore occurs in two disseminated porphyry deposits lying along a northwesterly zone of alteration. Previous mining in the district was confined to higher grade replacement deposits. The main ore mineral is a chalcocite enrichment of the primary chalcopyrite deposition. Three different instrusives have been recognized at Silver Bell—monzonite, dacite, and alaskite. Ore deposition is thought to be post-instrusive. The deposits are nearly two miles apart; the larger one, containing 19,800,000 tons of the 32,000,000-ton reserve, is called the Oxide orebody and was the first to be placed in production. It has furnished most of the mill feed since the start of the operation. Production from the 12,200,000-ton El Tiro orebody was increased near the end of 1955, and the whole project is geared so that approximately equal tonnages will be



CONVEYOR MAINTENANCE is simplified because most of the drives are located in one building. This belt, driven through Falk reducer, delivers ore to tertiary crushers.

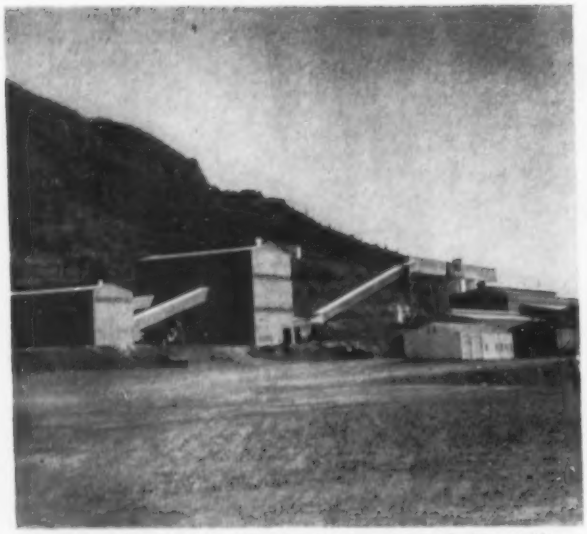


DUST ENCLOSED tertiary installation receives ore from conveyor-fed surge box at top. Two Symons shorthead crushers, near bottom, are in closed circuit with Tyler screens.



THIS BASE SUPPORTS the primary breaker which is a Traylor 48-inch gyratory crusher. Better supervision results at Silver Bell by housing all crushers in a single building.

CONTROL of pulp density and particle size of cleaner feed is maintained by Dorrclones in closed circuit with two Allis-Chalmers regrind ball mills.



SILVER BELL MILL treats 7,500 tons of ore daily. Building at left houses conveyor drives, and the one next to it the crushers. Main mill building and fine ore bins are at extreme right. On the staff are H. R. Hendricks, mill superintendent; D. R. Purvis, general superintendent; and R. B. Meen, mine superintendent.

drawn for mill feed from each open pit.

The capping overlying the ore body is quite hard, but the ore itself is only of average hardness. Low grade oxidized material is stockpiled in a dump located in a canyon 0.3 miles southwest of the Oxide pit for possible future leaching. The grade of milling ore is 0.9 percent total copper; the oxide copper content of this ore will assay 0.1 to 0.15 percent, the remainder being sulphide copper.

Mining

The heavy equipment employed by Isbell in the mining operation is composed of five churn drills, which are Bucyrus Erie 42-T, 29-T, and 27-T models; four shovels which include two Bucyrus Erie 120-B models with 6-yard dippers, and two Bucyrus Erie 54-B's with 3¾-yard dippers. The trucks are all Euclids, both the 15-yard TD and the 25-yard FFD models being used. The haulage capacity of the smaller TD is 22 tons of broken rock and that of the larger twin axled-FFD is 37 tons. The latter is powered by two 190-horsepower, General Motors Diesel engines. Each engine drives one of the axles through its own independent drive shaft and equalizing torque converter. The torque converters are made by Allison and maximum torque multiplication is 2.8. The dump hoist is a 3-stage, double-acting unit with positive pressure relief valve effective at each end of the stroke.

When mining was first started the bench height was maintained at 30 feet. The practice now is to use 40-foot benches so that the larger 120-B shovels could be brought in on the job and used to better advantage. Stripping of the present Oxide pit started in 1952 and in the El Tiro in 1953. Overall stripping ratio will be 1.2 to 1.0. The El Tiro pit is actually slightly lower in grade and the stripping ratio is somewhat higher.

TABLE No. I

Mining Data at American Smelting and Refining Company's Oxide Open Pit at Silver Bell, Arizona for Second Half of 1954

Tons broken per hole	2,600
Footage per drill shift B.E. 42-T	90
Footage per drill shift B.E. 290-T	70
Number of holes per blast	12 to 15
Shovel tons per shift, B.E. 120-B	6,159
Shovel tons per shift, B.E. 54-B	4,170
Tons hauled per shift, TD trucks	824
Tons miles per shift, TD trucks	597
Tons hauled per hour, TD trucks	110
Tons hauled per shift, FFD trucks	1,378
Tons miles per shift, FFD trucks	999
Tons hauled per hour, FFD trucks	184
Average length of haul, miles	0.724

Block Shots For Capping

Churn drill holes, 9⅞ inches in diameter, are 47 feet deep (7 feet below the bench level) for blasting purposes. The holes are spaced on 21- to 27-foot centers and placed about 14 feet behind the edge of the bench at the surface. This leaves approximately 26 to 27 feet of burden at the bottom of the hole. In the Oxide pit, a single row of holes is used to break the ground in ore. When the El Tiro was being stripped, the practice was to use block shots of multiple rows of blast holes to break the harder capping. Once the softer ore is uncovered, a method similar to that used at the Oxide pit will probably be employed.

The powder is special quarry 40 percent and LDX bag powder rated at 70 percent strength. Both types are used to get the proper loading depth in each hole. The 40 percent powder gives a rise of 2 feet per case while the 70 percent powder gives a rise of 1¼ feet in the blast holes. Isbell's formula at Silver Bell is to use three feet more of stemming in the blast hole than the spacing between holes. Thus, in the Oxide pit, where holes are generally on a 27-foot spacing, 30 feet of stemming is used on top of a 17-foot charge in the bottom of the hole.

Haul Roads

The roads used for bench access and those leading to waste dumps have been planned to keep the grade at 7.0 percent or under. The maximum adverse grade in the main haul roads outside the pits is 2 percent. The upper waste has been used to construct drainage dikes and dams protecting the pits from flash floods. Most of the waste is moved out as near to the elevation at which it was gathered as possible and with as short a haul as possible.

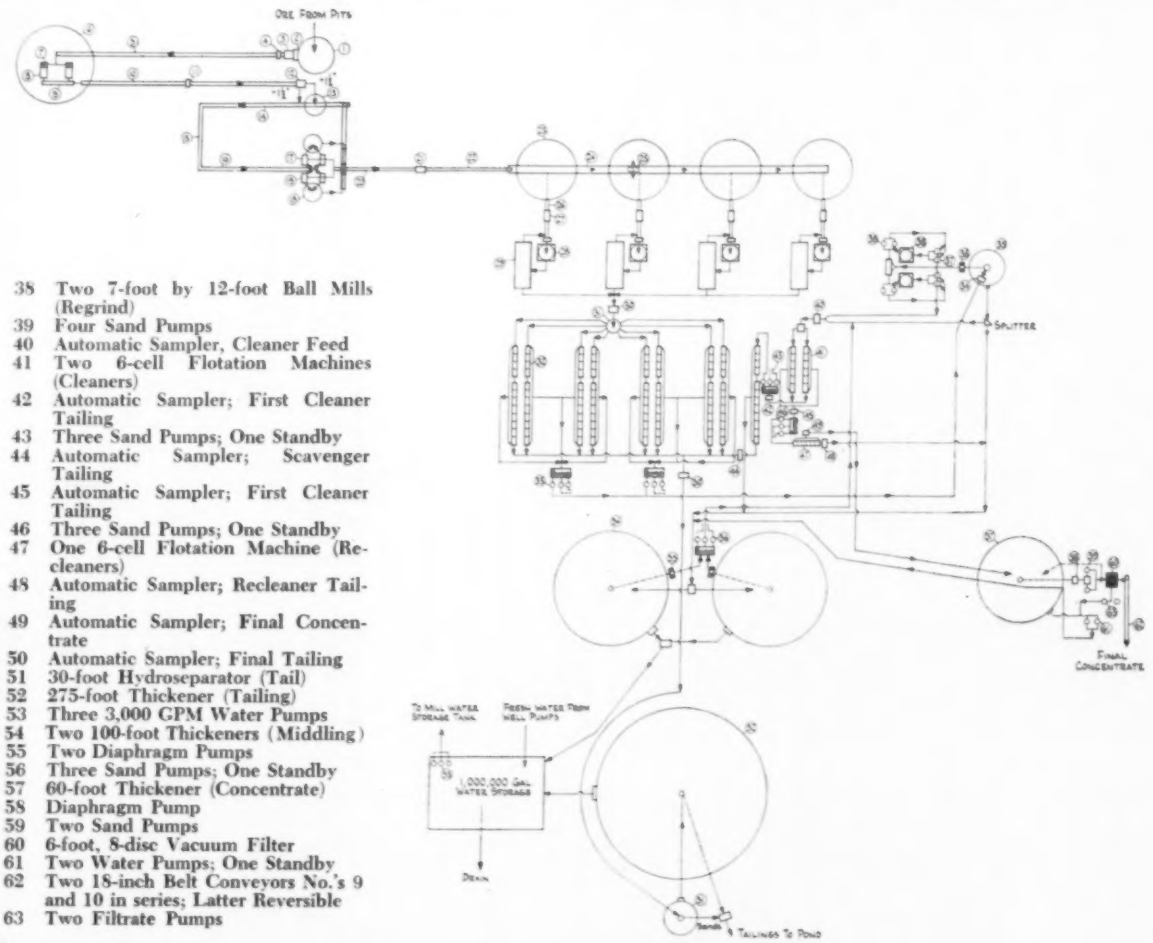
Every blast hole is sampled as it is drilled to determine cut off points.

TABLE No. II

Reagent Consumption at American Smelting and Refining Company's Silver Bell Mill (July 1955)

Lime	4.6	pounds per ton
Z-11, Z-6	.017	
Aerofloat 238	.035	
Dowfroth 250	.010	
Pine Oil	.028	

1 48-inch Gyratory Crusher (Primary)
2 72-inch Pan Feeder
3 Chute With Built In Grizzly
4 Magnetic Detector
5 48-inch Belt Conveyor No. 1
6 Coarse Ore Bin; 3000 Ton Capacity
7 Two Tunnel Gates
8 Two 48-inch Belt Feeders; 400 to 800 T.P.H. Each
9 42-inch Impact Belt
10 42-inch Belt Conveyor No. 2; 600 to 800 T.P.H.
11 Suspended Magnet
12 Chute With Grizzly
13 7-foot Cone Crusher (Secondary)
14 36-inch Belt Conveyor No. 3
15 36-inch Belt Conveyor No. 4
16 36-inch Belt Conveyor No. 5
17 Four 6-foot by 10-foot Vibrating Screens
18 Two 7-foot Cone Crushers (Tertiary)
19 Surge Box
20 One 36-inch Belt Feeder No. 5C
21 Merrick Weightometer
22 36-inch Belt Conveyor No. 6; 800 T.P.H.
23 Four Fine Ore Bins; 8,000 Tons Total Capacity
24 36-inch Belt Conveyor No. 7; 800 T.P.H.
25 Belt Propelled Tripper
26 Four 36-inch Vari-Speed Belt Feeders
27 Four Conveyor Weighers
28 Four 10-foot 6-inch by 12-foot Grate Discharge Ball Mills (Primary)
29 Four 78-inch Akins Duplex Screw Classifiers
30 Automatic Sampler
31 Pulp Distributor
32 Eight 12-cell Rougher Flotation Machines and One 12-cell Scavenger
33 Six Sand Pumps; Two Standby
34 Automatic Sampler, Rougher Concentrate
35 26-foot Hydroseparator (Concentrate)
36 Diaphragm Pump
37 Four Dorrclones
38 Two 7-foot by 12-foot Ball Mills (Regrind)
39 Four Sand Pumps
40 Automatic Sampler, Cleaner Feed
41 Two 6-cell Flotation Machines (Cleaners)
42 Automatic Sampler; First Cleaner Tailing
43 Three Sand Pumps; One Standby
44 Automatic Sampler; Scavenger Tailing
45 Automatic Sampler; First Cleaner Tailing
46 Three Sand Pumps; One Standby
47 One 6-cell Flotation Machine (Recleaners)
48 Automatic Sampler; Recleaner Tailing
49 Automatic Sampler; Final Concentrate
50 Automatic Sampler; Final Tailing
51 30-foot Hydroseparator (Tail)
52 275-foot Thickener (Tailing)
53 Three 3,000 GPM Water Pumps
54 Two 100-foot Thickeners (Middling)
55 Two Diaphragm Pumps
56 Three Sand Pumps; One Standby
57 60-foot Thickener (Concentrate)
58 Diaphragm Pump
59 Two Sand Pumps
60 6-foot, 8-disc Vacuum Filter
61 Two Water Pumps; One Standby
62 Two 18-inch Belt Conveyors No.'s 9 and 10 in series; Latter Reversible
63 Two Filtrate Pumps



Flowsheet of American Smelting & Refining Company's

Silver Bell Mill, Silver Bell, Arizona

Daily Capacity 7,500 Tons

The ore and waste are flagged for the shovel operators after the rock is broken. Sub-grade material and mill feed are then separated in the loading operation.

Crushing

At the mill three-stage crushing is utilized with the tertiary phase in closed circuit with Tyler 6- by 10-foot vibrating screens. Initial operations were in open circuit with these screens, but the advantage of sending a uniform-sized product to the grinding section outweighed the 10 to 15 percent reduction in crushing capacity. The plant is designed to operate in the tertiary stage in either open or closed circuit by minor conveyor changes. There is no coarse receiving bin; trucks dump directly into the 48-inch Traylor Bulldog gyratory primary crusher. The required mill feed storage is provided in four 2,000-ton fine ore bins serving the grinding section and one 3,000-ton intermediate ore bin fed from the primary gyratory.

Good Control Possible

The crushing and associated ore handling system at Silver Bell is well designed. The central crushing arrangement with height gaining conveyors, surge bins, and transfer conveyors located outside the crusher building provides exceptionally good control. The Traylor gyratory discharge drops upon a 72-inch Stephens-Adamson apron feeder that feeds conveyor Number 1, which in turn delivers the minus 8-inch ore to the 3,000-ton coarse ore bin. The ore, drawn from this bin by two 48-inch belt feeders, is transferred to an impact conveyor which feeds the Number 2 belt. A 1½-inch grizzly precedes the 7-foot Symons standard cone crusher set at 1 inch. Conveyor Number 3, which gathers the crushed ore from the secondary crusher, discharges to a short transfer conveyor (Number 4) located in the conveyor drive house. The flow of rock passes from the lateral conveyor 4 to conveyor 5 which provides the gain in height for feeding the tertiary crushing installation.

Conveyor Number 5 delivers ore to four Tyler Ty-Rock 6- by 10-foot screens with ⅝-inch openings. The oversize is fed to two 7-foot Symons shorthead crushers. The discharge from the shortheads is recycled back to the Ty-Rock screens by way of conveyors 5C, 3, 4, and 5. The screen undersize is carried by conveyors 6 and 7, in series, to a Hewitt-Robins tripper feeding the four cylindrical 2,000-ton fine ore bins behind the grinding section.

A conveyor drive house contains the motors and gearing arrangements for conveyors Number 1 through 4. On each installation the motor drives a conveyor through a centrifugal coupling, speed reducer, and chain drive.

Grinding and Flotation

Four Allis-Chalmers 10½- by 12-foot grate discharge ball mills, each in closed circuit with duplex Akins 78-inch spiral classifier, compose the grinding section. A belt feeder, fitted with a Fairbanks-Morse conveyor scale, draws ore from each fine ore bin and discharges into the scoop boxes on the ball mill. The classifier overflow averages 20 to 21 percent solids and screens 14 to 16 percent plus-65-mesh and 50 to 52 percent minus-200-mesh. The overflow is sampled automatically by a Denver unit before an 8-way pulp distributor divides the feed to the eight banks of 12-cell Fagergren 66-inch flotation machines in the rougher section. The rougher tailing is thickened and flows to the tailing pond through 16-inch transite pipe. The rougher concentrate is composed of the froth coming off all cells in this section. It is pumped to a 26-foot-in-diameter Dorr hydroseparator for a sand-slime separation. The sands are treated in a regrind installation made up of four Dorrclones in closed circuit with two 7- by 12-foot Allis-Chalmers overflow ball mills. All or part of the hydroseparator overflow is thickened in two 100-foot Dorr thickeners, and the thickener underflow is distributed to the cleaner cells.

In the regrind circuit the pulp first passes through the Dorrclones which make a separation at 325-mesh; then to the ball mills. (Two of the Dorrclones are in the circuit and two others serve as standbys.) The discharge from each ball mill is recycled to the Dorrclone whose overflow can be sent either to the two 100-foot thickeners or directly to the cleaner cells.

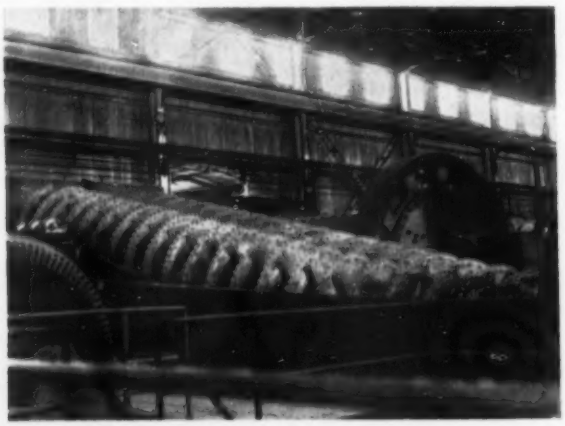
Cleaning

The rougher concentrate after regrind is first cleaned in two 6-cell Fagergren 56-inch flotation machines. The concentrate is recleaned in a six-cell bank of Denver Number 24 Sub-A flotation machines.

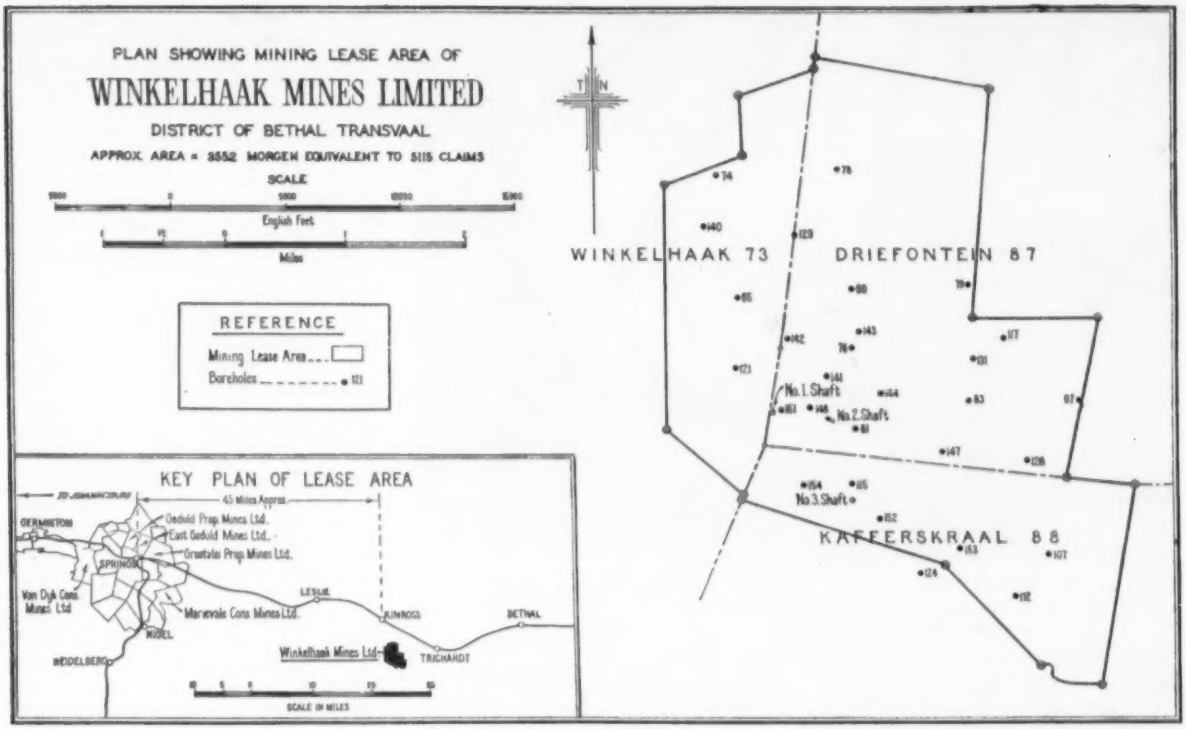
The tailing from the cleaners, which is the true mill middling product, is pumped to a 12-cell Fagergren scavenger installation rather than recycled back to the roughers. This is done to avoid the build-up of pyrite in the mill circuits. The scavenger tailing joins the rougher tailing and is thickened, sampled, and diverted to the tailing pond. The scavenger concentrate, together with recleaner

Continued on page 72

FLOTATION SECTION (left) of mill includes eight, 12-cell Fagergren machines, Fagergren and Denver cleaners and a scavenger installation for treating mill middling separately.



Grinding (right) is carried out in four Allis Chalmers grate discharge ball mills in closed circuit with Akins duplex classifiers. Variable speed belts feed ball mills.



Winkelhaak Mines . . .

Union Corporation Leads In Gold Development In Eastern Transvaal

Union Corporation, Ltd., the first company to bring a new gold mine into successful operation—from prospect to mining—in the Orange Free State, Union of South Africa, is now the first to do the same in the Bethal area in the eastern Transvaal.

U. S. Companies Financing

The name of the first gold mining company in the Bethal area is Winkelhaak Mines Ltd.—derived from the name of a farm, part of which has been incorporated in the lease area. The mine is administered by Union Corporation Ltd.

It has been said that many a mine has been ruined or spoiled by shaft-sinking. However, the concentration of boreholes in the lease area justifies the expectation that the shaft-sinking operations and development will amply confirm the core values. The unofficial prediction is that Winkelhaak is but the first of many mines in the area.

The major subscribers of the initial working capital have been Union Corporation and its subsidiary, Capital Mining Areas; The American Metal Company Ltd.; Anglo American Corporation of South Africa; Anglo-Rand Mining and Finance Corporation and its shareholders; Central Mining and Investment Corporation; Newmont Mining Corporation; Federale Mynboumaatskappy Beperk; Rio Tinto Company; Anglo-Transvaal Consolidated Investment Co. Ltd.; General Mining and Finance Corporation; Johannesburg Consolidated Investment Company; New Consolidated Gold Fields; and the general public.

Prospected 20 Years Ago

Pioneering methods in gold prospecting were started about 20 years ago in an area slightly west of the Kinross-Trichardt zone, by the Far Rand "A" and "B" companies. They had only partial success and interest subsequently lapsed. Then in 1949, with prospecting in the Free State and Klerksdrop fields largely completed, and with devaluation of most Western currencies providing a favorable financial background, diamond drills that were no longer busy were transferred to the Bethal area.

Many Companies Seek Claims

The acquistion of option contracts by Union Corporation Ltd. and Anglo-Rand Mining and Finance Corporation Ltd. stimulated interest in the area among the South African mining finance "houses" and abroad as well. They joined in the "rush" for options on property which might be extensions of gold-bearing areas, namely the Kinross-Trichardt zone. By 1953 about 600,000 claims had been signed up under option contracts in a zone that roughly embraced Kendal in the northwest, Leslie in the mid-west, Morgenzon in the south, Carolina in the northeast, and Amsterdam in the southeast. Much of this area has been now

COLLARING THE NO. 3 hoisting shaft at Winkelhaak Mines Ltd. in the Bethal district of the eastern Transvaal, Union of South Africa. This is only the first of what many believe will be major gold mines in the new district.

abandoned in the light of disclosures from geological surveys and drilling; but as geological definition was clarified, other areas were placed under option. For instance, Middle Witwatersrand (Western Areas) Ltd. of the Anglo-Transvaal group has acquired options over 97,920 claims in the general vicinity of Delmas—northwest of Kinross, of Leslie—west of the same point, and in the Standerton district to the south. It is also known that further west and extending northward into the Pretoria and Bronkhorstspruit districts, other zones have been brought into the mining picture by other companies. While drilling has been stated to be in progress in the latter district, detailed information is presently lacking.

So far only the area prospected by Union Corporation and Anglo-Rand has yielded the prize of economic gold values. Nevertheless, most of the other names associated with the recent phase of prospecting and "option-hunting" in the Bethal area have participated in subscribing the capital of the first mining company in the area. This has been the reward of teamwork, through the various levels of financial and technical administrators and staff at head-offices and in the field. Nevertheless, a name should be mentioned—one that was associated with the narrow failure in the mid-1930's of the second attempt to probe through the massive overburden of the Free State goldfield and is now associated with the successful attempt in the Bethal area—E. Jacobson of the Anglo-Rand Corporation, who initiated the preliminary investigation of its gold mining potential in 1949.

Incorporated on December 7, 1955, Winkelhaak Mines has a lease area of 5,115 claims on the farms Winkelhaak 73, Driefontein 87, and Kafferskraal 88; immediately south of Kinross on the Johannesburg-Bethal rail line, about 70 miles east of the city (see map).

The lease area was prospected by drilling from 1950 to 1955, following a geophysical survey. The drilling disclosed a geological succession occurring beneath a cover of approximately 700 feet of Karroo beds, with an extensive subsurface capping of dolerite bedding in the lateral or horizontal plane.

The geological succession has been interpreted as follows: Ventersdorp Lava; Upper Witwatersrand Sediments; Lower Witwatersrand Sediments. In the northern section of the lease area there is also a varying cover of dolomite and Pretoria beds of the Transvaal System. Gas has been manifested in boreholes, and operations are being regulated accordingly.

In the area generally, the drilling disclosed the Kimberley Reef to be the only economic gold-bearing horizon, in the lease area particularly, uranium values have so far been of no economic significance. Those boreholes which were extended to depth yielded no economic values on the Main Reef horizon.

The delineation of the lease area followed a very extensive drilling program. Twenty-eight of the many holes drilled in the zone now fall within the lease area, and another is located just south of the southern boundary, which more or less conforms with the suboutcrop of the Kimberley Reef. This horizon dips northward at between 25° and 30°. There are indications of fairly severe faulting.

The borehole south of the boundary was found to lie beyond the Kimberley Reef suboutcrop. Of the other 28, 12 failed to intersect this reef and were found to be located in faulted zones; in the other 16, the depth of this horizon ranged from 760 feet in the suboutcrop zone to 4,960 feet in the northern section. It is possible that at the boundary of this section the depth will range from about 5,000 more to the west to more than 6,000 feet more to the east. The Kimberley Reef generally is known to be among the less consistent gold carriers. It was perhaps for this reason that, once it was recognised as the economic horizon of the area, a more concentrated drilling program was conducted than has been the usual case, in order to prove the persistence of payable values beyond even reasonable doubt. The average of the intersected reef values indicates an overall grade of about 6 to 7 dwt over an assumed width of 40 inches. The wide range of values actually disclosed—trace to 1,094 inch-dwts—is in line with the known characteristics of the Reef, which include a somewhat erratic tendency also in respect to payability. The borehole assessment of this is estimated to range from about 55 to about 80 percent, but the average in actual development may come out nearer the higher percentage. The indicated average of values, of course, does not take into account the diluting effect of development ore included in the mill feed during the producing or milling phase, either initially or at the designated rates.

The 12 borehole failures to intersect the Kimberley Reef are attributed to faulting and not to the absence or non-deposition of mineral. As mentioned earlier, the indicated faulting is fairly severe, and as a corollary, the possibility of water-bearing fissures being encountered is commensurate. While the shallow depth and the nature of the covering beds in the suboutcrop zone are compensating factors, perhaps to a considerable degree, the indications are that further north, under the lava particularly, the initial rock temperature will be higher than the Rand average.

Sinking Two Twin-Shafts

To accelerate development of the ore body, two twin-shaft systems are being sunk in the suboutcrop zone of the mine. Each of the four shafts will be an 11-foot lined-diameter, circular and vertical unit. In each system, the

two shafts will be a few hundred feet apart; the hoisting shaft will be downcast and the ventilation shaft upcast, with the ventilation up-dip from the hoisting shaft. The hoisting shaft of the southerly system, No. 3, is about 1,500 feet from the boundary. The corresponding shaft in the northerly system, No. 1, is about 5,000 feet northwest. Both hoisting shafts will be sunk to a final depth of about 1,500 feet, expected to be reached by about the year-end. In the No. 3, the Kimberley Reef may be intersected between 1,100 and 1,200 feet—the nearest borehole values were 349 inch-dwts; and in the No. 1, between 800 and 900 feet—the nearest borehole values were 271, 316 and 542 inch-dwts.

The two hoisting shafts will be equipped with rail guides in each of the two compartments. In each will be a 4½-ton drop-bottom skip, suspended above a mancage. There will be the usual service columns for power, compressed-air, and water.

Each will have 700-horsepower, double-drum hoist. The hoisting speed will be 2,000 feet per minute. The hoisting capacity will be capable of sustaining the intended initial milling rate of 60,000 tons a month, expected to be started at about mid-1958.

The ore body will be opened up in the initial stages by means of contour reef drives advanced at vertical intervals of 175 feet, and interconnected by raises-winzes cut at intervals on strike.

100,000 Tons Per Month Cost

The rate of ore treatment planned for the second phase of production is 100,000 tons a month, which should be attained by about mid-1960. The time schedule for both phases of production is subject to the absence of abnormal interruptions and to the availability of adequate labor at the various stages of the program. The expansion in the second phase will involve the sinking of a main hoisting shaft, downcast for ventilation, to be located about 2,700 feet east of the No. 1. The reef may be intersected between 1,800 and 2,000 feet, but the shaft will be sunk to a final depth of about 3,750 feet.

The reduction plant is expected to follow the usual pattern of the more recent plants of the group, such as at St. Helena Gold Mines, Ltd., but the design has not yet been decided.

The estimated cost—at current levels of prices and charges—to bring the mine to the treatment rate of 100,000 tons a month is as follows:

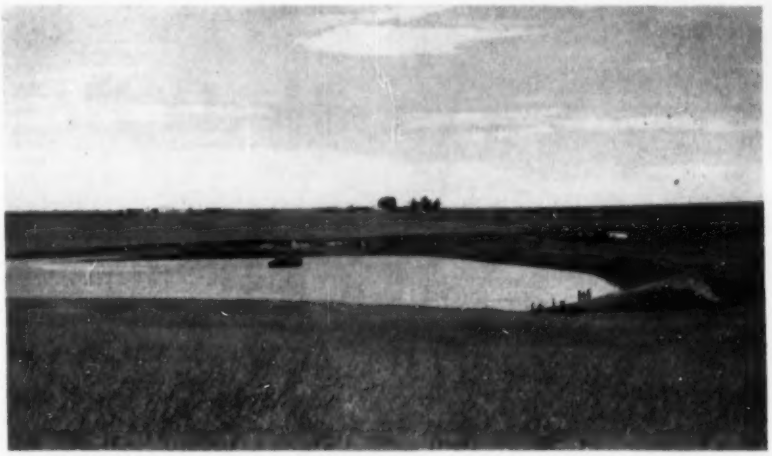
Shaft-sinking and equipment	£ 2,223,000
Development and underground equipment	1,270,000
Surface installations	1,452,000
Reduction plant (100,000 tons/month)	1,630,000
European housing	2,084,000
Administration and general	435,000
Stores on hand at date of production and sundries	360,000
	£ 9,454,000
Contingent liability to Electricity Supply Commission	250,000
Provision towards a permanent water Supply	150,000
Cost of property, lease and surface	600,000
Total	£ 10,500,000

In January 1955, the area of supply of the Eastern Transvaal Undertaking of the Electricity Supply Commission, which operates the Witbank and Wilge generating stations extended its supply area. The Winkelhaak mine has been connected with the power network through a line from Bethal; in the near future, a second line will be brought from the Wilge station to serve the mining area.

Water supplies are presently being drawn from boreholes. A water conservation dam has been completed with a capacity of 1,300 acre-feet.

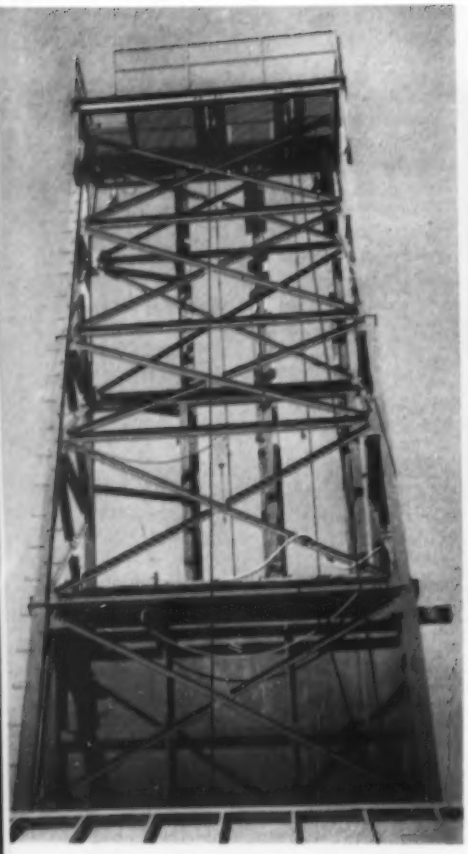
Easier Than Free State

Pioneering efforts in developing the mining potential of the Bethal area will be easier than in the Free State. Most of the services required—especially power and transportation facilities—and accessibility to the engineering workshops and supply stores of the Rand were at arms length, before the survey pegs were driven into the top-soil.



WINKELHAAK MINE early in 1956 showing the No. 3 hoisting shaft site at left and the location of the hoist house on the right. Winkelhaak is being financed by Newmont Mining Corporation, American Metals Company Ltd., and others.

GOLD-BEARING KIMBERLY REEF underlies this peaceful farming area at depths from 760 to 4,960 feet. Water storage dam in foreground, mine shops on left horizon, and the old farm house in the trees at right which is now used for mine office.



WELL ARRANGED PLANT at the Radon property, which Hecla Mining Company is operating for Federal Uranium Corporation, is evident from photo above. At left is a view of the headframe above the 690-foot shaft, deepest on the Colorado Plateau. Headframe stands 75 feet above the shaft collar.

Hecla Hoists Ore From

IF careful pre-planning will help pave the way for future profits, then Hecla Mining Company is off to a flying start at Federal Uranium Corporation's Radon property in San Juan County, Utah. Hecla, as contract-operator for Federal, has begun limited production from the deepest (at 590 feet) uranium deposit yet developed on the Colorado Plateau. The flat dipping ore body has been estimated to contain ore valued at $20,000,000.

There are several factors which make this operation one of the most outstanding uranium ventures to date. At least the record seems to indicate so. This is why:

Hecla personnel, who know how to sink a shaft, reached a timbered depth of 690 on August 29, just 65½ working days after the shaft had been collared to a 21-foot depth. This meant that an average advance of 10.2 feet per day, including timber, was maintained in the three-compartment shaft. During the only calendar month worked, the shaft was extended 310 feet.

Second, thoughtful attention has been devoted to developing complete working plans before each phase of the project is started. For instance, plans and specifications for surface buildings and equipment including arrangement of units were drawn up before the site was cleared.

Now that actual production in ore is getting underway, a mine development program has been outlined which features extreme flexibility. Either highly mechanized mining or more careful, ground-control, stoping methods can be adopted from one master development plan. Thus, if it appears that ground conditions are favorable, Hecla will be able to swing into high-tonnage producing jumbos, loaders, and Diesel haulage. If not, then a panel stoping system, using slushers to reclaim broken ore, can be used.

U & I Drilled

The Radon ore body was originally acquired by U & I Uranium, Inc., an organization formed by six Idaho corporations with lead-zinc holdings in the Northwest. This company put down 34 drill holes and partially outlined a substantial tonnage of ore. The Idaho firm also held an adjoining property known as the Hotrock group.

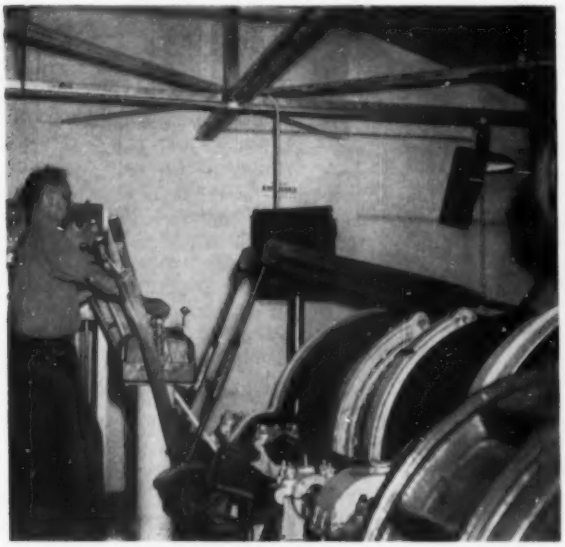
Hecla Mining Company entered the picture, early in 1955, when they negotiated an operating agreement with U & I. Basically, under the terms of the contract, Hecla agreed to reimburse the Idaho company for expenses incurred in drilling and exploring the Radon and Hotrock groups. In return, Hecla agreed to develop and mine the Radon deposit on a profit-sharing basis. Hecla can, in addition, if it elects to, take over exploration and development of the Hotrock property. According to the agreement, Hecla will be reimbursed for capital expenditures for the mine plant and for development costs before mining profits are split.

Immediately after the contract was signed, Hecla resumed the drilling operation and bored 31 more holes all of which were between a depth of 600 and 700 feet. The function of these holes was to furnish the data essential to planning. The deposit was outlined in greater detail, and the holes yielded information for selection of a shaft site.

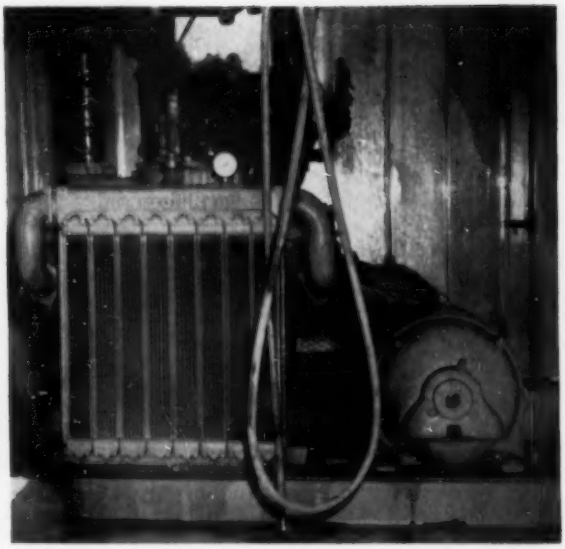
Federal Inherits Contract

Soon after the operating contract was signed, Federal Uranium Corporation, which was busily merging and consolidating several properties, acquired the Radon and Hotrock interests held by the U & I. With the U & I acquisition, Federal Uranium inherited the contract involving the Hecla Mining Company to mine the Radon ore and to drill adjoining holdings. This is where events stand today.

The ore body, which strikes north 22° to 24° west, has a gentle westerly dip of approximately 7°. The ore occurs at the base of the Chinle D for-



HOIST CONTROL is fully magnetic with a Lilly controller and a mechanical interlock which makes it impossible to disengage the clutch without first setting the brake. Hoistman Harry Austin worked for Hecla in the Coeur d' Alene district.



COMPRESSED AIR is furnished by two Ingersoll Rand 90-B compressors, one of which is shown above. Total piston displacement of the 90-B is 515-cubic-feet-per-minute. Space has been left to install a third compressor if necessary.

The Deepest U.S. Uranium Mine

mation, (consisting of red and red-brown shales and sandstones) in contact with the lower Cutler formation, (consisting of light colored sandstones).

Other operators in the vicinity are Hidden Splendor Mining Corp.'s Almar property, some 1,500 feet to the northwest, where a 573-foot shaft was sunk on a deposit, and Homestake Mining Company and Cal Uranium Company (now Mountain Mesa Uranium Corporation of Wyoming) some three miles to the southeast.

Shaft Site

These factors were taken into consideration before the site was selected. First, it was desired to bottom the shaft near the down-dip edge of the orebody. Second, Hecla wanted to center the shaft along the long dimension of the deposit so that equal haulage distances from the extremities of the ore body to the shaft would result. This was a primary factor for future mining economics, since unduly long haulage distances would be avoided.

Extensive topographic surveys were conducted and the region in the vicinity of the ore body thoroughly contoured. This data was correlated with drill information so that a good, solid rock foundation for the collar, headframe, hoisthouse, and other buildings could be selected.

Hecla moved in an experienced shaft crew from the Coeur d'Alene mining district—the same crew that it used to sink the 2,400-foot Atlas shaft east of Mullan, Idaho.

Crane and Clamshell

Actual clearing and preparation of the Radon shaft site began March 15, 1955. Miller Steel Company began erecting the Armco steel buildings according to the plans previously laid out by Hecla engineers. The shaft was excavated to a 21-foot depth using a truck-mounted crane with a clamshell bucket. This was timbered and 35 cubic yards of concrete poured at the collar before the 75-foot bolted steel headframe was erected. Sinking operations were resumed June 20.

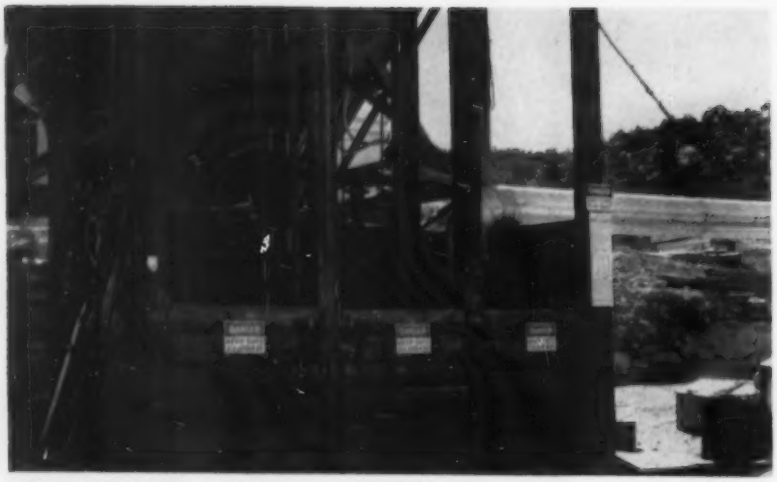
Shaft Sinking Statistics at Radon Property

Total Timbered Depth	690 feet
Advance, June 20 to August 29*	669 feet
Total Days Worked	65.5
Total Man Shifts Worked	790
Average Advance Per Day	10.21
Average Advance Per Man Shift	0.85
Man Hours Labor Per Foot	
Drilling	1.78
Blasting	0.73
Mucking	2.85
Timbering	2.01
Piping	0.31
General	1.15
Smoke Delay	0.64
Other Delay	0.24
Total Man Hours Labor per Foot	9.75
Skips Hoisted per Foot	10.7
Holes Drilled per Foot	8.2
Pounds Powder per Foot	28.8
Sticks Powder per Foot	93.8
Sticks Powder per Hole	11.4

* 21 feet sunk and timbered before headframe erected.

The three equal sized compartments in the Radon shaft each measure 5 feet 6 inches by 4 feet 4 inches. Total rock excavation to handle the timber was about 8 by 18 feet. Timbered sets are on 5-foot 3-inch centers and a total of 131 sets, not counting the collar set, were placed to reach the timbered depth of 690 feet. The 8- by 8-inch shaft timber was framed at Burke, Idaho and shipped to the mine near Moab via rail and truck. The shaft was collared in the Wingate formation, and sunk 165 feet before entering the Chinle formation. The upper station, from which development headings in ore will be driven, is 590 feet below the surface and bottom at the Chinle-Cutler contact.

A bench round was used during sinking with anywhere from 25 to 30 holes requires per bench. The holes were drilled 6 to 7 feet deep with Ingersoll Rand, J-50 jackhammers using ⅞-inch steel and both Liddicoat and Coromant bits. Bench height was approximately 3 feet. The round was blasted with Dupont extra D powder which was primed with Dupont Gelex 3 and fired electrically from the surface.



SUNK IN A HURRY, the three compartment shaft was bottomed at 690 feet after maintaining a daily advance of 10.2 feet. The producing horizon was crossed at the 590-foot depth. Ore is hoisted in 50-cubic-foot skips operating in balance.

Mucking was done with a Riddell mucking machine. The control unit was usually suspended on the next to last set above the bottom. The clamshell capacity was ⅓ cubic yards. Ordinarily timber was carried to within 15 to 20 feet of the bottom, but, at times, it was necessary to place the last set within 4 or 5 feet of the bottom, depending on rock conditions.

On each shift four men worked on the bottom. This is contrasted with South African practice where labor is cheap and a large number of natives, standing almost shoulder to shoulder, are used. Hecla worked the shaft three shifts per day seven days per week. The muck was hoisted in 30-cubic-foot sinking buckets equipped with sliding safety crossheads. Downcast ventilation was provided by a Joy, 20-horsepower fan, located on the surface, which exhausted air through 20-inch fan tubing. For the mining operation, a Joy, 20-horsepower fan with a capacity of 20,000 cubic feet per minute, will be installed to exhaust air through 30-inch fan pipe. The tubing will be nailed to an endplate and a wallplate of each set in one corner of the manway compartment.

A Day's Work

The shaft advance averaged 10.2 feet per day excluding work necessary for cutting stations. This would probably include about 82 drill holes, six to seven feet deep, drilled and blasted, 145 tons of muck hoisted, and two complete sets of timber installed. Timber blocked in place for the two sets consisted of 16 posts, 4 wallplates, 4 endplates, 4 dividers, and panel lacing. In addition, shaft guides were installed along with a manway landing and ladder, 6-inch air line, 2-inch water line, and 20-inch ventilation tubing. This constituted the work load for any given 24-hour period.

The only full calendar month worked was July when Hecla completed 310 feet of finished shaft. This is believed to be only 17.5 feet shy of an all-time United States sinking record for any month.

Ore Development

This is how the over-all development plan has been laid out. The shaft, it will be remembered, was sunk near the middle of the down-dip fringe of the deposit. From the shaft station on the 6,260 level a drift will be driven in ore both northwest and southeast to the limits of the ore body. About 90 feet south of the station, a service incline, crossing the deposit, will be driven up the approximate 7-degree dip of the ore to the opposite boundary. Three additional strike drifts in ore will be advanced in general north-south directions at right angle to the service incline to fully develop the mine. The four strike drifts will be on 120-foot centers, and at respective elevations of 6,260, 6,280, 6,300 and 6,320 feet. The shaft was collared at 6,851 feet.

Haulage on the four levels in ore is by 41 cubic foot Granby cars and 3-ton battery locomotives. Eimco muckers with "A" type decks and short arms are used, so that excessive waste will not have to be broken when the strike drifts are in thin portions of the ore body.

Haulage Level

Forty feet below the 6,260 shaft station, a haulage level has been completed. From this lower horizon, on the 6,220 level, a cross cut was extended under the ore body which paralleled the service incline in the ore, though it was offset from it several feet. Three transfer raises will connect the 6,220 cross cut with strike drifts 6,280, 6,300 and 6,320. Two slusher pockets were cut near the shaft on the 6,220 level and a transfer raise will connect the 6,260 drift directly with one of the pockets. Ore will be transferred from the upper headings through one of the raises to the 6,220 level for haulage to the slusher pockets.

Ore dumped in each slusher pocket is scraped to a measuring pocket which holds one skip load. The measuring pocket is lined with AR steel plate; the gates are 32-inches wide and 27 inches high and are operated by 8-inch air cylinders with 34-inch strokes. The sheets for the measuring pockets were cut and fabricated by Hecla in the mine shops.

On the upper level, a ventilation incline will be driven, from the shaft, parallel to the service incline. Air will be exhausted through the ventilation incline by the Joy 20-horsepower fan and through the tubing installed in the manway compartment of the shaft.

SUPERVISING the Radon operation for Hecla is Bill Love, superintendent, left, and Jim Greenslade, mine engineer, right. Mr. Love hired the same crew that sunk the Atlas shaft east of Mullan, Idaho, in 1952-53 for the Radon project.

Initially, headings developed from the upper shaft station are being tracked; however, the flexibility of the system leaves the door open for trackless mining, if it proves feasible. The advantages of this preliminary plan are a minimum of development work in waste (about 600 feet, including the lower haulage level, tail room for trains, and transfer raises). In addition, this development pattern will not strap the company with a set mining plan which might later prove to be uneconomical.

These options are available for ore handling:

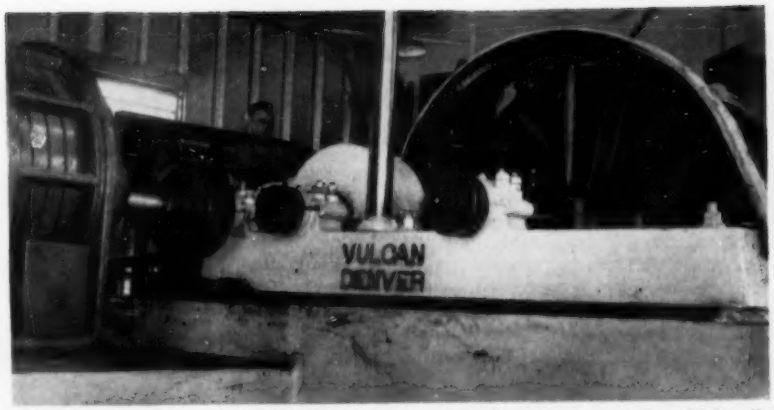
1. Strike drifts in ore can be tracked and ore trammed to transfer raises via trains. Ore drawn from the transfer raise on the lower level would be hauled by train to the slusher pocket.
2. If trackless mining appears possible, rail can be stripped from strike drifts. Loaders or shuttle cars can dump ore in one of the transfer raises for haulage by train to the slusher pocket on the lower level.
3. A third option is to bring ore from strike drifts down the service incline dumping in 260 raise which empties directly to the slusher pockets.

Any combination of these methods can be used, and in turn they will fit almost any type of stoping adaptable to an ore body of the size and shape of the Radon deposit. It may be that, with rock bolting, the ground will stand open over fairly wide spans so that room and pillar mining with mechanized equipment can be used. If not, then panels using slushers to scrape ore to strike drifts can be applied. In any event, the plan is to work from the limits of the ore, both north and south of the service incline, and retreat toward the incline.

Detailed Planning

The entire surface installation was pre-planned before one single stone was turned for the shaft site preparation. Building locations, arrangement of haul roads leading into and away from the ore bin, headframe design, construction details of buildings, layout of storage area for items, such as pipe, timber, track, and a multitude of other details, were carefully arranged in a series of plans which were closely adhered to during succeeding installation of units.

The mine plant was carefully designed for maximum efficiency, contact of supervisors with miners, and for requisitioning supplies. Such things as providing enough headroom in the dry so that clothes suspended on the hanging baskets don't brush one's head when standing or walking; a road which circles the headframe so that empty trucks can enter from one direction, leave with their load in another, eliminate unnecessary maneuvering before the empty can be spotted under the chutes. In addition, miners walk past the supervisor's office and the clerk's office to get their lamps when going on shift. When coming off shift, they follow the same route in reverse. Thus, the superintendent is in a position to talk to individuals both going and coming. If a man needs supplies, he can requisition them from the clerk at this time.



HOISTING CAPACITY is sufficient for a 250-ton-per-day operation, and could handle up to 400 tons if necessary. Basic unit is a Vulcan Denver, double-drum machine powered by a Western Electric, 100 horsepower induction motor.

All these small details have added up to one thing—one of the best surface mine plants on the Colorado Plateau for an underground uranium mine.

The headframe is 75 feet high, of bolted steel construction, and accommodates a 250-ton ore bin. Hecla engineers did the basic design and the structure was fabricated by Grand

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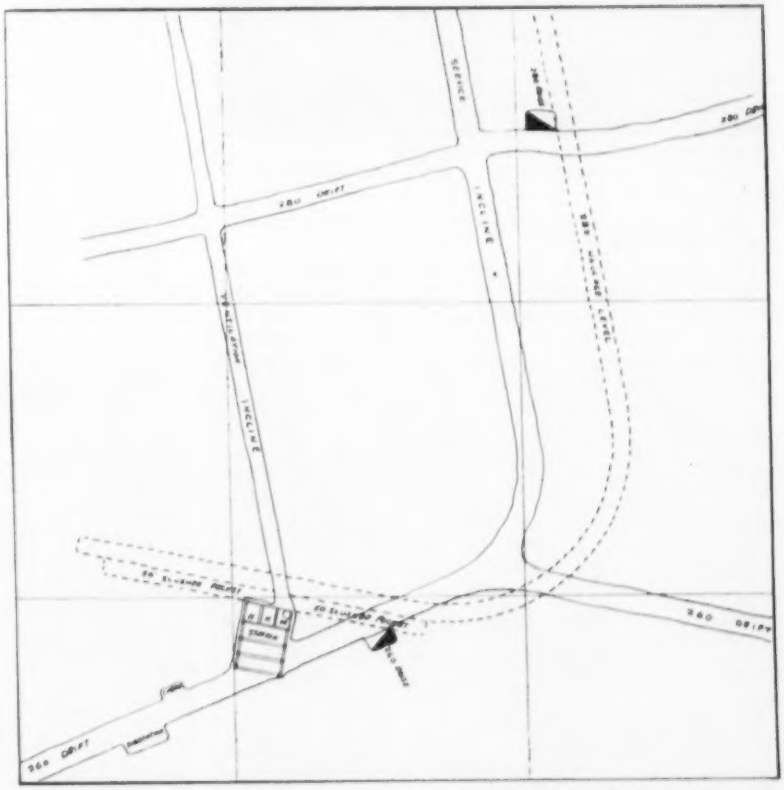


PLAN MAP of proposed mine development gives an idea of how the workings will be arranged. All development will be in ore with the exception of the lower level shown by broken lines. Scale of map was 1-inch to 20 feet.

MONEY MAKING METHODS

How A Fork Lift Truck Makes Portable Drill Platform In Swedish Lead Mine

An entirely new concept in the appplication of the familiar fork lift truck has been pioneered and perfected in Sweden's largest lead mine by officials of the Bolidens Mining Company. Working with representatives of the Hyster Company, Bolidens is now performing drilling and elevating tasks that have been exceedingly difficult in the past.

The lift forks of one of the RT-150's have been removed and a platform bearing four chain-fed drills has been mounted directly on the sliding carriage of the truck. The weight of this platform with drills is close to three tons. The platform with drilling mechanism is then raised to proper drilling height, as the picture on the left illustrates. Capable of drilling benches up to 30 feet high, the application of the Hyster RT-150 has considerably speeded up the operation.

Raising and lowering of the platform containing the drilling apparatus can be accomplished from the platform itself. Compressed air, used for drilling, is furnished by a

BARRING DOWN from movable platform 30 feet in the air.

HYSTER RT-150 Drilling platform in use at Swedish mine.

stationary compressor connection, hoses of which follow the channel uprights.

The Hyster "150" is specially designed for rough ground conditions, being equipped with large pneumatic tires. With speeds up to 18 miles per hour, these machines can quickly roll to the job at hand. Down time has been cut, and the platform can be dismounted in less than a half hour if the truck is needed elsewhere.

Another novel adaptation of the fork lift truck is the specially designed scaling platform 15½ feet high. The standard equipped lift truck forks are inserted under this platform. This enables Bolidens to scale down the back 39½ feet above the floor. The 24-foot lift height on the machine, plus the 15½-foot platform, makes this possible. The platform itself is built on two 4-foot "U" beams, with a body of 3-inch armor tubes and rods of 2-inch tubes.

How To Move Coarse Pulp Cheaply

If you ever have the problem of moving a coarse pulp horizontally over a few 10's of feet and you want to do it cheaply you will be interested in this solution.

The Baguio Gold Mining Company at Baguio, Mountain Province, Philippine Islands installed a new ore washing plant adjacent to its cyanide plant. Coarse ore from washing plant is fed to the crushing plant by belt conveyor. However, the slime and fine ore presented a problem. It would cost too much money to pump, it was too slimey

MOVING COARSE PULP HORIZONTALLY with old classifier parts.

to transport on a belt conveyor, and the terrain was such that it wouldn't flow by gravity. So, general superintendent Bob Mahan came up with the reciprocating drag shown in accompanying photograph.

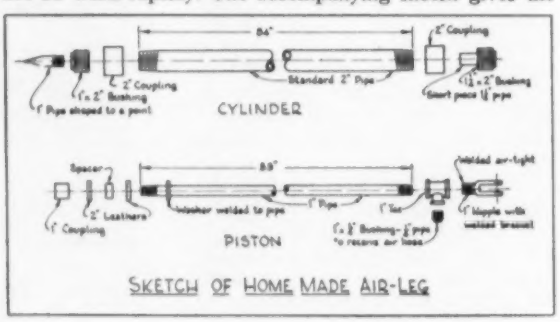
Several old Dorr reciprocating rake classifiers were available. The drive unit and head motion from one was salvaged and installed inside the mill. To it was attached a long drive rod which operates a series of small rakes in a wooden launder. The pulp was thus raked from the washing plant right into the ball mill scoop box.

How A Small Mine Operator Made Air Leg For Drilling

While operating a small silver property, a Montana prospector decided to obtain an air leg for his sinker-type drill. The method of driving the drift has been to use the sinker on a "Mexican set-up" in the soft and medium hard ground, and to use a bar-mounted drifter when it was necessary to drill in the harder limestone.

The outright purchase of a leg to fit this drill was too high for his meager pocketbook, and second-hand legs were almost impossible to obtain at that time, so the prospector decided to try to make an air leg for his sinker drill. Koehler Stout, assistant professor of mining at the Montana School of Mines, Butte, Montana, reports here how this was done in the hope that other small mine operators will be able to do the same, thus making their under-financed operations more efficient.

After looking at some of the commercial drills, a leg with a 2-inch-diameter piston was deemed large enough to handle the sinker. Several lengths of 2-inch-diameter pipe were examined to find one where the ridge on the inside of the pipe, formed in welding the pipe together, was not too pronounced so that the leather gaskets would not be worn rapidly. The accompanying sketch gives the



SKETCH OF HOME MADE AIR-LEG

dimensions and component parts of the leg. The 54-inch length of 2-inch-diameter pipe was threaded on both ends. Then the inside was polished a little, with some emery paper tacked to a cylindrical wooden block and turned by a small ¼-inch electric drill. Regular 2-inch pipe couplings were screwed to each end of the pipe. A 1- by 2-inch bushing was screwed on one end; into this bushing was screwed a 1-inch piece of pipe with a tapered end to form a point. A 3-inch piece of 1¼-inch-diameter pipe was cut and screwed into a 1¼- by 2-inch bushing. These fittings were then screwed to the other end of the two-inch pipe. This completed the cylinder of the leg which is also the stinger.

The piston rod was made from a 1-inch piece of pipe 55 inches long and threaded at both ends. It was decided to use two leathers on the piston because of the roughness on the inside of the 2-inch pipe. Two 2-inch leathers were purchased and cut to fit over the 1-inch pipe. The backing and spacing for the leathers was formed by large steel washers which had outside diameters of 1⅞ inches. The end washer was welded to the 1-inch pipe which formed a backing for one of the leathers and then several washers were set between the two leathers to form the proper spacing. A regular 1-inch threaded coupling was screwed on the end of the 1-inch pipe to hold the leathers and washers in place. First it was necessary to ream the washers out so they would fit over the 1-inch pipe.

The bottom end of the 2-inch pipe cylinder was unscrewed and the piston and rod were pushed through this end. The 1-inch pipe just fitted into the 1¼-inch pipe on the other end of the 2-inch cylinder. This completed the leg.

The next problem was to make a bracket to hold the machine and also a valve assembly. A regular 1-inch pipe tee was screwed on the end of the 1-inch and the hose was attached by a ¼- to 1-inch bushing and a short piece of ¼-inch pipe. This assembly can be seen in the photographs.

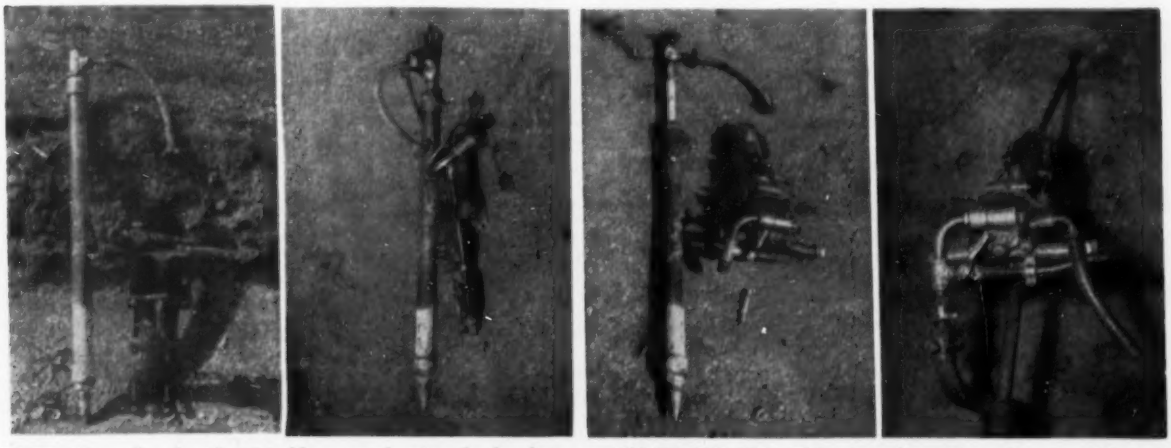
Because ⅜- by 2-inch strap iron was available, it was decided to make the bracket for the machine from it. The bottom of the bracket can be seen in Photograph No. 1. Half inch bolts attach the bracket to the side rods of the machine. A 3-inch piece of strap iron was welded at right angles to the middle lower side of the bracket as shown in Photographs Nos. 1 and 2. This piece had a ⅜-inch-diameter hole drilled in it as shown in Photograph No. 2. The bracket was then inserted in a vise and the machine placed in it and carefully lined up so the leg and the machine would be in the same plane. The handle was removed from the machine and the two side pieces, which were ⅛-inch thick and 2 inches wide, were welded to the cross bracket to hold the machine firmly in the bracket. (Photograph No. 2.)

Two pieces of ⅜- by 2-inch strap iron were cut and ⅜-inch holes drilled in them. These were then welded to a 1-inch nipple with a ⅜-inch space between them so the bottom piece on the machine bracket would fit into this slot. This nipple was then screwed into the pipe tee on the end of the 1-inch cylinder rod after making it air tight. Photographs Nos. 1, 2, and 3 show this arrangement. Photograph No. 4 shows a good closeup view of the valve assembly. The valve is an ordinary ¾-inch knox valve with a small hole drilled on one side of it to act very similarly to a stop and waste valve. The valve was turned to the "full on" position and a 5/32-inch-diameter hole was drilled through the side of the valve until the hole tapped the air channel. This valve was not too successful because there was no setting which would hold air in the leg. It was either feeding air or letting air out. On the next valve, the hole was not drilled at right angles to the line of the valve, but at approximately 60° to the full open position of the valve. This valve worked much better because there are three positions: "air on," "hold," and "release." The rest of the connections into the leg can be seen in the photographs.

Almost the entire air-leg was constructed from material obtained around the mine. It took a while for the drill operator to get used to handling the machine, but it worked quite satisfactorily. It was first used in the hard limestone, and a round could be drilled much faster than with the drifter set up. Photograph No. 4 shows the machine at the face.

This machine doesn't work as well as the commercial air-leg machines do because the valve is not a pressure control type which most of the commercial machine valves are. However, when the machine gets drilling it is quite common to get the valve set properly, and then the leg feeds the drill without further adjustment. It certainly is a much easier and better set up than trying to breast holes in or using a "Mexican" set up.

The drift the machine was used in is only 4 by 6 feet and the original leg was a little clumsy, so 18 inches were cut off both the cylinder and piston rod. Now the leg has a 30-inch feed and works very well in the small size opening.



LEFT. View of underside of jackhammer showing the bracket which attaches to the top of the air-leg shown at left. LEFT CENTER: This is a side view of the machine and the air-leg. RIGHT CENTER: This view shows the valve assembly and the back of the machine. RIGHT: This close up view shows the machine and home made air-leg drilling a mine face.

Claims Court Rules

Gold Miners Can Collect Damages

Court Findings:

- L-208 amounted to temporary taking of the profitable use of properties; therefore just compensation should be paid within meaning of Fifth Amendment to Constitution.
- Those not entitled to recover were those never required to close by L-208 so there has been no taking of rights.
- Cases where damage existed will be remanded to a Commissioner of the Court for trial on the question of damages.

What Happens Next?

- Government can appeal findings and has 90 days to file a writ of certiorari with Supreme Court to review decision. Government will probably do this.
- If Supreme Court upholds decision, measure of damages must be determined in each case.
- Possibility of further extension of deadline for claim filing is seen if Supreme Court upholds findings. This will permit filing by additional claimants.

The United States Court of Claims on February 20, 1956 handed down its long-awaited decision in the omnibus Gold Cases, which have been pending since June 1951. The Court upheld, by a 3-to-2 decision, the contentions of western gold miners that they are entitled to be paid just compensation for the taking of their right to make profitable use of their gold mining properties—the taking being the result of the closing of their mines by War Production Board Limitation Order L-208, dated October 8, 1942.

The six gold mining companies which were held by the Court to be entitled to receive damages from the government are: Bald Mountain Mining Company, Lawrence County, South Dakota; Ermont Mines, Inc., Beaverhead County, Montana; Homestake Mining Company, Lead, South Dakota; Alaska-Pacific Consolidated Mining Company, Willow Creek district, Alaska; Idaho-Maryland Mines Corporation, Grass Valley, California; and Central Eureka Mining Company, Sutter Creek, California.

Companion suits filed by Alabama-California Gold Mines Company, and Oro Fino Consolidated Mines, Inc., Auburn, California; and Consolidated Chollar Gould & Savage Mining Company, Virginia City, Nevada, were dismissed, as the Court stated it did not appear that these three companies were entitled to recover.

It is anticipated that the Department of Justice attorneys will seek to carry the questions involved to the Supreme Court for a final determination, and it may be almost a year before there is a final determination by the Supreme Court on the issues involved.

Congressman Clair Engle, Red Bluff, California, long a champion of the small miner, makes this significant statement about an appeal. "No doubt the government will appeal to the United States Supreme Court. The Court of Claims, incidentally, in the majority opinion makes the significant statement that 'the right of a gold mine owner to extract gold from his mine and to sell it for a profit is a property right protected by the Constitution.' That is the basis of our long standing claim that the present Treasury Regulations, which require a gold miner to sell his product to the government at less than it cost him to produce it, are unconstitutional. If this view is sustained in the Supreme Court, there is every likelihood that the Treasury gold regulations, which have straight-jacketed the gold miner for years by requiring him, under criminal penalties, to sell his production to the Federal government at a price fixed by the Federal government, may be stricken down."

Fifteen claims were filed in the Court of Claims during the month of June 1951, just prior to the expiration of the Statute of Limitations against such claims, which would have expired on June 30, 1951. This represented, in large measure, the activity of George A. Nugent, long prominently identified with western gold mining, chairman of the United States Gold Committee, and a member of the law firm of Nugent & Nugent, with offices in the American Building at Washington, D. C., in rallying the gold mining industry to assert its rights. Mr. Nugent, at a later date, in association with Robert S. Palmer, executive vice president of the Colorado Mining Association, brought about the introduction and passage by the Congress of the Special Jurisdictional Act of July 14, 1952, extending the Statute of Limitations for a year from that date, and which resulted in 146 additional claims being filed with the Court of Claims. These will await the final decision of the Supreme Court in the instant cases in the event that Court grants a petition for writ of certiorari —which it is anticipated the government will file within the prescribed 90-day period—and undertakes the review of these cases.

It is anticipated that if the Supreme Court upholds the present decision, the United States Gold Committee, and other mining interests, will seek a further extension, as it is anticipated an additional substantial group of potential claimants have not, for a variety of reasons, sought to assert their claims up to this time.

In its majority decision, by Judge Littleton, concurred in by Judges Madden and Whitaker, the Court of Claims ruled that WPB Limitation Order, L-208, which it called "arbitrary and unreasonable," amounted to a temporary taking of the gold mining properties in those cases in which the mine owners and operators were forced to close their mines in compliance with the Order, and were prohibited from using their own materials, facilities, and equipment to mine gold. Such mine owners and operators are entitled to be paid just compensation for the losses complained of.

The cases at their present stage involve only the question of the liability of the Government for losses sustained. The question of the measure

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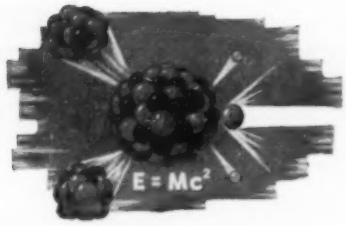

FISSION FACTS

Monthly Roundup of Mining News In the Atomic Energy Field

Phillips Co. To Explore Northwest Uranium Areas

Phillips Petroleum Company is joining the search for uranium in northeastern Washington and the Idaho Panhandle through an agreement with Northwest Uranium Mines of Wallace, Idaho. Phillips will explore and develop a substantial portion of more than 100,000 acres of leased land held by Northwest Uranium in return for half of any net profits.

The leases are in Spokane, Stevens, Ferry, and Pend Oreille counties in Washington, and in Kootenai, Bonner, and Boundary counties, Idaho. Most of the land is state-owned.

Not included in the transaction is land in the Spokane Indian Reservation in southwestern Stevens County where bulldozing by Northwest Uranium has shown autunite mineralization in a zone 1,000 feet long and about 500 feet wide. The company has applied for a $53,000 DMEA loan and plans to drill 12,000 feet of percussion holes to depths of 100 to 200 feet in order to test the sedimentary beds. The firm will also diamond drill 1,500 feet of holes up to 350-foot depths in two mineralized fault zones.

New-Shat-Tex Corp. Plans U_3O_8 Mill at Mexican Hat

New-Shat-Tex Corporation has been negotiating with the Navajo Tribal Council for lease of 101 acres of land on the south bank of the San Juan River southwest of Mexican Hat, Utah. New-Shat-Tex, a wholly owned uranium subsidiary of New Jersey Zinc Company, Shattuck-Denn Mining Company, and The Texas Company (oil), desires to build a uranium mill on the land.

The Indians are agreeable to the lease and construction of the mill, but the land is in a federal power site withdrawal, and a federal petroleum reservation. Therefore the company has requested the Department of Interior to lift withdrawals so that the mill can be built.

Crane and Vitro Plan Rare Earths Operation

Crane Company and Vitro Corporation of America have agreed to combine efforts in the production of rare earths, thorium, and heavy minerals from monazite, rutile, ilmenite, zircon, and kyanite.

Under the arrangement, both firms will own 40 percent each in Heavy Minerals Company, a former subsidiary of Crane Company organized in 1953, and also in the mining subsidiary, Marine Minerals Inc., and associated operations. The remaining 20 percent will be held by Societe de Produits Chimiques des Terres Rares (STR), a subsidiary of the French firm of Pechiney. Heavy Minerals has an exclusive North American license to numerous patents held by STR on the processing of thorium, rare earths, and heavy minerals.

Heavy Minerals will proceed with plans for building processing facilities on a site now owned near Chattanooga, Tennessee. Marine Minerals, located near Aiken, South Carolina, will continue its mining for rutile, ilmenite, zircon, and monazite. The latter two will be processed by Heavy Minerals.

Another mining operation is currently being developed along the Gulf Coast of Florida between Panama City and Pensacola. A plant for separation of the beach sands will be built at Panama City.

Frank F. Elliott, president of Crane, will become chairman of the board of the joint operation, and J. Carlton Ward, Jr., Vitro's president, will be president of the new undertaking.

Russia and Yugoslavia Join To Build Reactor

The governments of the Soviet Union and Yugoslavia signed a mutual assistance agreement in the field of nuclear energy on January 28, 1956. Under the agreement the first Yugoslavian atomic reactor will be built. The atomic fuel as well as certain reactor parts will come from the Soviet Union. Other parts and construction forces will be Yugoslavian. The Soviet Union will also supply scientific assistance for the project.

A Round-Up of Australian Developments in Uranium

In mid-1954 a uranium prospecting boom mushroomed in Australia. The following is a state by state round-up of current developments taking place.

QUEENSLAND—One thousand tons of equipment for Mary Kathleen Uranium Ltd., Mout Isa, is being rushed to the construction site by trucks before the onset of the wet season. Rio Tinto Ltd. has completed initial drilling operations, and, subject to negotiation of a satisfactory sales contract, will provide the entire amount of the extra capital needed to bring the venture to the production stage. Due to security regulations, the details of the operation can not be made public. It was generally known sometime ago, in the early stages of drilling, that ore tonnages were of the order of several hundred thousand tons.

NEW SOUTH WALES—Directors of Atlas Corporation, New York and of North Australia Uranium Corporation N. L., advise that an inspection has been made of a radioactive mineral deposit in the Trackaringa Hills, 15 miles west of Broken Hill. Negotiations have not yet been finalized. Broken Hill is one of the areas in New South Wales considered most likely to have uranium deposits. Silver Valley Uranium M. L., one of the few New South Wales uranium companies formed, has abandoned its mine at Torrington.

WESTERN AUSTRALIA—A preliminary examination of an aerial scintillograph survey, conducted by the Commonwealth Bureau of Mineral Resources, shows large areas of radioactivity in the northwestern portion of the state. Best regions appear to be in the Pilbara district, especially near Bamboo Creek, northeast of Marble Bar. Ground inspections have been made there. The radioactivity is generally caused by volcanic rocks and some of the anomalies may be due to uranium or thorium.

NORTHERN TERRITORY—The first annual meeting of North Australian Uranium Corporation N. L. (Atlas Corporation holds a 50 percent interest) disclosed some interesting things. Contrary to the usual case, it has been found in the company's Sleisbeck-South Alligator River areas that the grade of uranium in deposits so far examined is richest near the surface. The ore bodies either have no great depth or decrease in grade at lower horizons. It is uneconomical to transport the ore to Rum Jungle for treatment but the erection of a treatment plant in the South Alligator River area will be economically sound if about 1,000,000 tons of ore containing 0.25 percent U_3O_8 can be proved.

It was felt that this amount of ore would almost certainly be proved, even if only in the areas now held by several of the companies in the district. The existence of uranium mineralization along the whole line of non-conformity in the field, together with the recent discoveries of primary pitchblende at El Sharana are very encouraging. Dr. Wimber of Atlas Corporation has already spent over a month examining the North Australian Uranium Corporation areas and will shortly present a report.

Uranium Development and Prospecting N.L. has entered into an agreement with North Australian Uranium Corporation N.L. for joint development of the Uranium Development or Prospecting areas in the South Alligator River zone. The new company will be called South Alligator Uranium Corporation Ltd. By mergers such as this, Atlas is indirectly extending its influence into other companies.

Dr. George Sleiss, discoverer of the Sleisbeck field, will make a survey of areas held by Uranium Holdings N.L. Uranium Holdings is one of the companies formed to investigate certain Northern Territory areas at the height of the uranium boom. So far it has had no success in discovering anything of note within its holdings.

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DOW

A typical mining operation using Separan 2610 to obtain uniform and rapid liquid-ore separations.

FLOCCULATING POWER, EASE OF USE, ECONOMY, CREATE BIG DEMAND FOR SEPARAN 2610

Outstanding new efficiency can be brought to settling and filtration operations. That's the reason for the soaring demand for Separan* 2610. Exciting case histories are piling up.

One Thickener for Five

One uranium ore processor was able to eliminate four of his five thickeners with the addition of Separan 2610. Two banks of filters and several earthen ponds were also no longer needed. The savings? Nearly $3000 per day. In another uranium mill, production was at 50% of capacity due to low filtration rates. But when 0.2 pound of Separan 2610 per ton was added, the filtration rate doubled—and so did production!

Settling Faster, Filtration Better

The advantages of using Separan 2610 are numerous. Overhead clarity is increased, materials lost in overflow decreased. In filtration, this synthetic non-ionic polymer increases cake weight per unit area of filter and reduces moisture content. Washability is increased, the cake is more homogenous and easier to handle.

Dow Xanthates—Dowfroth 250

Separan 2610 is the latest addition to the Dow family of chemicals for mining. Dow Xanthates, the collectors to use in all flotation of sulfide minerals, and Dowfroth® 250, the frother for improved metallurgy with reduced frother consumption, are two other well-known Dow mining chemicals. For a sample or information on any of these products write to THE DOW CHEMICAL COMPANY, TECHNICAL SERVICE AND DEVELOPMENT, Midland, Mich., Dept. SC926D.

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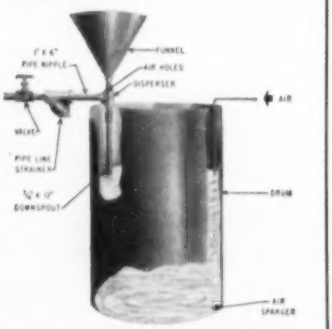

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United States

Personalities in the News

FRANCIS B. SPEAKER was recently appointed consultant on mining matters in the Office of Minerals Mobilization. Mr. Speaker, who is presently employed as an engineer by Hewitt-Robins, Inc., Stamford, Connecticut, was engaged in copper mining in Arizona and Mexico prior to World War II. During the War he was chief of the Non-Ferrous Metals Division of the War Production Board, and later served as Mining Division director of the Defense Materials Agency during the Korean conflict.

Clarence B. Randall has retired as chairman of the board of Inland Steel Company, but will continue as a director with offices at company headquarters. Although Mr. Randall's post has not been filled, his responsibilities have been transferred to **Joseph L. Block**, president of Inland. **Edward L. Ryerson**, former board chairman, has retired as chairman of the executive committee, but will also continue as a director and maintain offices at the company. Elected to fill the newly created posts of senior vice president and assistant to the president were, respectively, **P. D. Block, Jr.**, in charge of raw materials, and **Neele E. Stearns**, in charge of planning and administration. Both men will also continue in their present offices.

Dr. Robert J. Anderson has resigned as head of the department of metallurgy, Southwest Research Institute, San Antonio, Texas to join the Diamond Metal Company, Inc., and associated enterprises, Houston, as director of research and development. Before joining Southwest Research five years ago, Dr. Anderson practiced as a consulting metallurgist for a number of years in Cleveland, Ohio.

F. A. "Fritz" McGonigle, vice president and general manager of Manganese, Inc., Henderson, Nevada, has been promoted to vice president of Haile Mines, Inc., of which Manganese Inc. is a subsidiary, and will have offices in New York City. A graduate of the University of Idaho School of Mines, Mr. McGonigle has had varied mining experience, and was given the highest civilian award ever granted a foreigner by Peru when he subdued a general strike in that country. He is presently first vice president of the Nevada Mining Association. Succeeding Mr. McGonigle as general manager at Manganese, Inc., is **Royce A. Hardy**, formerly general superintendent of Getchell Mine, Inc., near Winnemucca, Nevada. Mr. Hardy is a graduate of the University of Nevada Mackay School of Mines and did postgraduate work at the University of Arizona.

Keith Kunze has been appointed general superintendent of Getchell Mine, Inc. near Winnemucca, Nevada. Mr. Kunze, who came to Getchell in 1951, was formerly mill superintendent. Before his employment at Getchell, Mr. Kunze was associated with Central Eureka Company at Sutter Creek, California, Newmont Mining Company in California and Colorado, and U. S. Vanadium Company in Bishop, California.

Rush Muse has been advanced from pit general foreman to assistant pit superintendent at Kennecott Copper Corporation's Nevada Mines Division. Mr. Muse has worked for Kennecott since graduating from the Texas College of Mines in El Paso. Before graduation he was employed by Peru Mining Company, Isbell Construction Company, and C. S. Elayer.

Howard W. Miller has been appointed superintendent of the zinc mining operations of The New Jersey Zinc Company at Jefferson City, Tennessee. Starting with the company in 1946 as geologist at the Austinville, Virginia mine, Mr. Miller was then transferred to Jefferson City where he eventually became assistant superintendent of operations there.

C. Waldie Taylor has been appointed general pit foreman of the Ray Mines of Kennecott Copper Corporation in Ray, Arizona. Mr. Taylor started with Kennecott in 1940 and has most recently been drilling and blasting foreman at Ray. His successor is **Glen B. Wilson**, pit shift foreman, who has been a Ray Mines employee since 1949.

Allen D. Look, subdistrict supervisor of the accident prevention branch of the U. S. Bureau of Mines at Phoenix, Arizona, has been transferred to Duluth, Minnesota where he is district supervisor.

J. M. Shields is now assistant superintendent of the West Hill mine at Grand Rapids, Michigan of Pickands Mather & Co. Mr. Shields, who was superintendent of the Biwabik mine, has been with the company since 1919.

Phil Blazovic, Jr. has resigned as production manager of Carbola Chemical Company at Natural Bridge, New York, and is now assistant manager of the Consolidated Feldspar Department of International Minerals & Chemical Corporation, Erwin, Tennessee.

The Anaconda Company and its employees were recently cited by the Treasury Department as the first large industrial organization in 1956 to have achieved approximately 80 per cent employee participation in the U. S. Payroll Savings Bond Plan. EDWARD S. McGLONE, left, executive vice president of Anaconda, accepted the award from W. RANDOLPH BURGESS, right, undersecretary of the Treasury.

JOHN P. HAMM has been appointed assistant to the president, Western Machinery Company, with headquarters in San Francisco, California. Following graduation from the University of Colorado in 1934 he engaged in milling of gold and base metal dumps in Cripple Creek and Leadville, and open-pit gold mining and milling at Crystal Hill, all in Colorado. His best known operation, John Hamm Mining and Milling Ltd., was an important base metal producer during World War II. He is a widely known gravity concentration and flotation expert and worked on copper flotation for Western Machinery for several years with headquarters in Salt Lake City, Utah. He has been associated with Western Machinery for five years. In 1949 and 1950 he was president of the Colorado Mining Association.

John H. Baker has been promoted from mine superintendent duties at Bonanza, Utah to assistant to the general manager of production for the American Gilsonite Company. He will have headquarters at the Salt Lake City office. **Paul Borden** will succeed Mr. Baker.

William B. Towner has been appointed general production manager of Foote Mineral Company. He has been with the Philadelphia firm since 1943 and most recently was plant manager of the plant at Exton, Pennsylvania.

Warren D. Jensen, supervisor of training for Oliver Iron Mining Division's eastern district, has been appointed staff assistant to the vice president of mineral development. Oliver is a division of U. S. Steel Corporation.

James M. Deatheridge, New Mexico state land office geologist, has resigned in order to return to the New Mexico Institute of Mining and Technology at Socorro.

John D. Boentje, Jr. has been elected vice president of Pacific Isle Mining Company at Hibbing, Minnesota. At the same directors' meeting, **Conrad Mertley** was elected treasurer of Coons Pacific Company at Eveleth, Minnesota.

R. B. Fuller has been appointed special consultant to the Phosphate Minerals Division of International Minerals and Chemical Corporation at Bartow, Florida. Mr. Fuller has been assistant to the vice president of the Florida division since 1953. New manager of the Florida operations will be **E. T. Casler** who succeeds **Floyd B. Bowen**, who was recently promoted to production manager for the Phosphate Minerals Division at Bartow. Other appointments at the Florida division are **W. O. McClintock**, assistant manager for engineering; **H. T. Loehr**, assistant manager for production; **H. E. Uhland**, chief engineer; and **F. J. Clawson**, chief metallurgist.

Newsmakers in International Mining

DR. ARTHUR A. BAKER has been appointed associate director of the U. S. Geological Survey. Since 1953 he has been administrative geologist in the office of the director. Dr. Baker graduated from Yale University and later received his Ph.D. degree there. His continuous employment with the Survey dates from 1921 when he was appointed geologic aid and sent to Alaska to investigate petroleum possibilities in the Cook Inlet area. Since then he has done geologic work in many parts of the U. S., especially in Utah. He is the author of a number of geologic works on varying subjects. A member of several scientific organizations, Dr. Baker has served as District of Columbia representative for the American Association of Petroleum Geologists, president of the Geological Society of Washington, councillor of the Geological Society of America, and vice president of the Washington Academy of Sciences.

Roy Glover, president of the Anaconda Company, was recently honored by the University of Chile when he was named a member of the University's Institute of Political Administrative Sciences. Mr. Glover was in Chile to inspect Anaconda's copper mining properties there.

Franc. R. Joubin, president of Algom Uranium Mines Limited of Ontario, has resigned and will resume his role as a geological consultant. As a consultant he is retained by Rio Tinto of England on a global basis and is currently on a tour of African mines. **W. H. Bouck, Q. C.**, vice president of Algom, will succeed Mr. Joubin as president. Mr. Bouck was associated with Mr. Joubin and **Joseph Hirschhorn** in the initial discovery and development of the Algoma uranium fields.

H. H. Dunkin, associate professor of mining at the University of Melbourne, recently started a six-month tour of South Africa, Rhodesia, the United Kingdom, the United States, and Canada.

Dr. mont. Otto Kaiser, who was formerly with the Ministry of Trade and Reconstruction in Vienna, Austria, has been appointed a member of the planning bureau and leader of research in the field of ore-dressing of the government-owned Bangka Tin Mines at Pangkalpinang, Bangka, Indonesia. Newly appointed mining engineer in the ore-dressing section of Bangka is **Ir Nio Tjoe Hauw**, formerly on the faculty of the mining engineering department of Technical University in Delft, Holland.

Fikry Mohamed Morsy, mining engineer with the Hamata Mining Company in Egypt, recently has been transferred from eastern desert operations to the firm's mining department in Cairo.

Hilmi Alozkan, mining engineer with Genel Mineral A. S. in the E. K. I. Karadon-Gelik area of Zonguldak, Turkey, has transferred to Yolcu Salonu Karsisi, Mocan Han, Galata-Istanbul, Turkey.

A. G. Palmer has resigned from the staff of Lake George Mines in Australia to start a private practice as a mining consultant with offices on Bond Street in Sydney, Australia.

Dr. John M. Warde, formerly head of the ceramic laboratory of the metallurgy division at the Oak Ridge National Laboratory, has transferred to the Union Carbide Ore Company, a division of Union Carbide and Carbon Corporation, where he deals with raw materials problems. Dr. Warde joined the Oak Ridge laboratory, which is operated by Union Carbide Nuclear Company for the U. S. Atomic Energy Commission, in 1952 after two years as mineral specialist for Africa and Europe with the Foreign Minerals Region, U. S. Bureau of Mines. Before that he had spent ten years in South Africa with the Vereeniging Brick and Tile Company, there concerned with raw material procurement and ceramic engineering. Dr. Warde holds degrees from the University of Alabama and the University of Cape Town, Union of South Africa.

Ir R. Levinson, mining engineer, has left Southern Rhodesia and now lives in Rotterdam, The Netherlands.

Arvid E. Honkala, mining engineer from Crystal Falls, Michigan, is now with the New York and Honduras Rosario Mining Company in Santa Barbara, Hoduras, Central America.

A. B. T. Ng of Malaya has completed work for the Bachelor of Mining Engineering degree at Melbourne University in Australia and is now on the staff of King Island Scheelite N. L., Grassy, King Island, Australia. He will later return to Malaya.

HAROLD B. EWOLDT (left) has been appointed assistant to the president for mining matters of Cerro de Pasco Corporation, mining firm with properties in the U. S. and South America. Mr. Ewoldt, a graduate of the South Dakota School of Mines, previously served as vice president of Copper Range Company and as manager of the zinc division of Calumet & Hecla, Inc. He is a member of the A.I.M.E. and of the Mining and Metallurgical Society of America. Appointed as assistant manager of operations for Cerro de Pasco is HORACE W. HIGGS, (right) who was formerly assistant general superintendent of smelting and refining. In his new post Mr. Higgs will continue in residence at Oroya, Cerro de Pasco's smelting and refining center in the Central Peruvian Andes. He has degrees from the University of Utah, and before joining Cerro de Pasco in 1949 served as metallurgist for American Smelting & Refining Company in East Helena, Montana.

J. C. FERGUSON, presently in charge of the Southern Rhodesian Geological Survey, is director designate for the Survey which will come into existence on July 1, when the Geological Survey departments of Southern Rhodesia, Northern Rhodesia and Nyasaland are intergrated.

R. V. Mandhre, formerly Atomic Energy Commission geologist at Garhi, Banswara, India, is now geologist in charge with the department of atomic energy at Ghatsila, Bihar, India.

Jose Urquidi Rivas, business superintendent of Empresa Minera Corocoro, Bolivia, has moved temporarily from Corocoro to La Paz where he may be reached in care of Corporacion Minera de Bolivia.

Sir George Thomson and **Sir Hugh Warren** have become members of the technical committee of the International Tin Research Council.

William R. B. Foster has been appointed to the board of Mt. Isa Mines, Queensland, Australia.

Daniel Brink, mining engineer from South Africa, recently joined the Tennessee Copper Company chemical engineering department as an analytical chemist in the laboratory. A native of the Orange Free State in South Africa, Mr. Brink was educated at Stellenbosch University near Capetown and Rhodes University of South Africa. He was employed by Anglo-American Corporation, a copper and cobalt producer in Northern Rhodesia, and later in a metallurgical laboratory in Johannesburg.

Gerald L. Schlesinger, of A. Keyser and Company, is succeeded on the board of the New Consolidated Mines of Cornwall by **A. J. Gould.**

Sherman A. White, general superintendent of mines for Nickel Processing Corporation in Nicaro, Cuba, and **Floyd E. Albertson**, general plant superintendent in Nicaro, have been appointed assistant general managers of the corporation which operates the United States government-owned nickel plant at Nicaro.

Henry L. Hill, consulting mining engineer, has been elected president of the British Columbia & Yukon Chamber of Mines for 1956. Vice-presidents elected are **J. A. Pike**, Newmont Mining Corporation of Canada Ltd., and **Ulric S. Annett**, Canadian Industries (1954) Ltd. Among those elected to the committee are **W. B. Burnett**, Cariboo Gold Quartz Mining Company Ltd.; **Charles M. Campbell**, consulting mining engineer; **B. I. Nesbitt**, con-

Continued on page 71

Anaconda Company Subsidiaries Will Undertake Two Major Copper Expansion Programs in Chile

The Anaconda Company through its two subsidiaries—Andes Copper Mining Company, and Chile Exploration Company—has started two major copper expansion projects in Chile. The first, by Andes Copper, will bring the Indio Muerto property into production five years from now. This production will supplement that from Andes' Potrerillos mine which will be worked out in four to five years. The second, by Chile Exploration, is to build and equip a plant to recover byproduct molybdenum from the sulphide copper ores now being mined in ever increasing amounts as the Chuquicamata open pit is deepened; also, a partial revision of the electrolytic tank house to provide facilities for production of electrolytic copper. These same type modifications will be made later at Andes, that is, to recover molybdenum from Indio Muerto ore, and to produce electrolytic copper.

At Indio Muerto exploration work has been conducted since 1952. Intensified drilling has been confined to an area called Turquoise Gulch. A limited amount of drilling in only a small part of the mineralized area, has already developed a reasonably assured ore tonnage of approximately 78,000,000 tons with a grade of approximately 1.6 percent copper. A large amount of underground development and additional drilling will continue to prove additional ore believed to be in the district.

Present plans provide for the development of the deposit in the Turquoise Gulch area as an underground mine. At this mine a main haulage tunnel will be driven which will be electrified for the haulage of the ore to the head of the surface railway. There will be an inclined shaft sunk to the working levels of the ore body from a point near the Turquoise Gulch area to be used for service, personnel and materials. Ore bins and coarse crushing plant will be constructed underground and a complete ventilation system will be provided together with the installation of power sub-station, compressor plant, shops, etc.

The surface installations proposed will consist of transmission lines and water lines to the property, the construction of approximately 16 miles of meter gage railway connecting the tunnel portal of the Turquoise Gulch mine to the fine crushing plant site in the Pastos Cerrados Canyon below Potrerillos at an elevation of approximately 2,400 yards; a belt conveyor system about 3.6 miles long to deliver the finely crushed ore to ore bins at the main reduction works of the Potrerillos plant some 770 yards above the fine crushing plant; revision of the reduction plant installations at Potrerillos principally in the concentrating plant including the provision for concentrator bins and the most modern flotation installations. The company will also construct a tailings dam and auxiliary installations to impound the tailings from the new ores milled in Potrerillos.

At the mine, the plans provide for the construction of a town near the mine site embodying the various features required for a modern village with corresponding facilities. The company proposes at the same time to modernize the dwellings of its employees in Potrerillos, construct a new theatre modernly equipped, construct a new employee's club and in general to undertake various other welfare projects to accomplish extensive improvements in its townsite installations at Potrerillos.

Atlas Copper Completes First Year of Production

On February 23, 1956 Atlas Consolidated Mining and Development Corporation completed its first year of operation at its Toledo, Cebu, Philippine Island open-pit copper mine and flotation mill. In the year 1,307,004 tons of ore were mined and milled from which 17,052,004 pounds of copper were recovered. Both tonnage treated and pounds of copper recovered per month have steadily increased; first, as the new mill reached capacity and operators became experienced, and second, as new equipment was added to bring tonnage to 6,000 tons per day. Expansion to 10,000 tons is already well underway with equipment shipments from the United States scheduled in mid-year.

Copper recovery was 13.05 pounds per ton or 0.652 percent. This is well below average grade of the deposit and is due to the fact that with the high price of copper Atlas management is milling, at a profit, large tonnages of semi-oxidized ore and low-grade sulphide ore which initially had not been figured as milling grade. Of necessity it had to be stripped to reach sulphide ore; it was then milled rather than placed in dumps for possible future leaching.

February copper recovered hit an all-time monthly high of 2,069,600 pounds, according to Col. Andres Soriano, Atlas president.

J&L Acquires An Option On Quebec Iron Deposit

Jones & Laughlin Steel Corporation has acquired an option on a large iron ore deposit in Quebec from Quebec Cobalt and Exploration Ltd., of Montreal, Canada. For a two-year period and a guaranteed minimum expenditure of $250,000, J&L will explore these properties located in the Mt. Wright area of New Quebec, about 190 miles north of the port of Seven Islands and 40 miles west of the Hollinger-North Shore Railroad which also serves the Knob Hill-Labrador iron deposits, 180 miles north of Mt. Wright.

If development work meets with present expectations within the two-year period, Jones & Laughlin will then consider construction of a beneficiating plant to treat the ores. Preliminary work conducted by Quebec Cobalt since 1952 has outlined approximately 1,000,000,000 tons of 32 percent iron ore. Most of this is a coarse hematite with lesser amounts of magnetite. The Jones & Laughlin work during the 1956 and 1957 seasons will consist of drilling and otherwise testing this large deposit. Preparations are now being made to transport equipment to the site.

The operating agreement provides for a lease whereby minimum royalties of $50,000 a year for a period of two years will be paid to Quebec Cobalt. Thereafter minimum payments will be increased to $100,000 yearly.

When the property is in production, a royalty of 60¢ per ton of concentrate will be paid subject to an upward revision of 5¢ per ton for each $1 per ton advance in the Lake Erie price of iron ore, the base price being $10.10 per ton. In addition, there is provision for a royalty of $1.00 per ton on direct shipping ore that may be mined, with an escalator clause for increased royalty in the event iron prices advance. Royalties are subject to revision based on operating profit. Any minerals other than iron which may be found on the property and are not a part of the iron deposits are reserved for Quebec Cobalt & Exploration.

Peko Mines To Construct Northern Territory Plant

Peko (Tennant Creek) Gold Mines N.L. will build a copper smelter at its mine in Northern Territory, Australia at a cost of £A1,000,000. The smelter, the first in the Northern Territory, will be capable of handling ores from other producers as well as Peko's output. Construction will begin this spring and will be completed within three years.

Peko Mines has been sending copper for smelting and refining to Port Kembla, New South Wales, but company officials report that this facility is unable to handle the current volume of the company's production. Regular overseas shipments are planned by the company in the future.

Original Indian workings at Anaconda's Indio Muerto property, now renamed El Salvador.

MALAYA—During the current year, *Petaling Tin Ltd.* will operate its No. 3 dredge in a Sub-Lease area where it will re-dredge ground at an increased depth. The No. 4 dredge will commence similar operations in the same area. The No. 5 dredge will be treating low-grade ground in Sungei Way and Seaport Estates. The No. 6 dredge will continue operations in the Puchong areas at depth. In view of the large amount of previously dredged ground which will be treated during the current year, a somewhat lower rate of output must be expected.

JAPAN—Construction of a sulphuric acid plant, now underway at Kosaka mine by the *Dowa Mining Company*, will utilize the waste gases from the Kosaka smelter. Expected construction cost is $1,388,888.88. Production capacity is 3,000 tons a month. In addition, a zinc furnace will also be erected which, when completed, will increase present monthly production from 200 tons to about 500 tons.

LEBANON—The Director of the State Mineral Department at Beirut announces that large deposits of sulphur and asphalt have been found in Northern Syria.

INDIA—Geologists of the United Provinces' Directorate of Geology and Mining have carried out detailed investigations of copper deposits occurring near Pokhari in Tehri-Garhwal and have found that the deposits contain high-grade ore. Drilling is to be undertaken shortly. Another vein has been located near Bageshwar in the Almora district and further detailed work will be conducted here.

JAPAN—*Toho Titanium Company*, which has been rushing completion of its expansion program at Chigasaki, Kanagawa-ken, is now nearing its goal of 100 tons of titanium sponge per month. Toho was formed in 1953 as a subsidiary of *Nippon Mining Company* and in February 1954 built a 20-ton plant at Chigasaki. Later, this plant's capacity was increased to 40, then 60, and now finally 100 tons per month. As a result the country now has two large titanium producers with an output of 100 tons monthly—*Osaka Titanium Company* and Toho.

MALAYA — Malayan tin miners achieved a post-war record in 1955, producing 61,244 tons of tin-in-concentrates representing an increase of 0.91 percent over 1954, the previous high. Of the 71,161 tons of tin exported from Malaya in 1955, 43,454 tons were shipped to the United States—an increase of 7.48 percent over 1954. Exports to the United Kingdom dropped by 39.8 percent to 2,994 tons; decreased by 6.59 percent to Europe with 9,232 tons; and were lower to other Commonwealth countries by 5.12 percent to 6,626 tons. In January 1956, Malayan tin exports rose sharply by 40.68 percent to 6,618 tons compared with December, a much larger increase than normal. This was partly due to the disposal of six weeks' ore accumulation of the Pulau Brani smelter, and also to the opening of the *Straits Trading Company's* new smelter in the middle of the month.

JAPAN—*Mitsui Mining Company* has completed a new unit at its zinc refinery at Miike, Kyushu. Previously the firm has constructed four furnace banks with a capacity of 500 tons monthly. This second unit, designed by Singmaster and Breyer, now doubles capacity. Operating results show 20 to 30 percent lower costs, one-fifth as many workers because of continuous operation, increased recovery from 98.7 to 99.7 percent, no limitation to ore supply, and coal and power economy.

PAKISTAN—The Pakistan government is setting up a Mining Bureau for the proper development of mineral resources of the country. The director of the bureau will be an American who will take up his duties shortly. Reportedly, the present departments of the Director of Mineral Concession, Coal Commissioner, Chief Inspector of Mines, Chief Inspector of Explosives, and Director of Petroleum will be merged in the proposed bureau.

IRAN—Two chromite deposits are known to exist in Iran—one in the north, west of Mesched, and one in the south, near Daulatabad. Three companies are working on chromite—*Chromite Iran*, producing about 2,500 tons a year; *Societe Chromite*, producing about 1,000 tons annually; and the state-governed *Organisation du Plan*, with practically no output. The climatic and working conditions are very hard, and the known deposits are small. About 4000 tons from

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the southern deposits are sold to *Phipip Brothers* but the possibilities of finding more are very good. There are good chromite deposits in Turkey and in Baluchistan (Pakistan), and the missing link in the chain of mountains is Iran, so if transportation improves, prospecting should be more rewarding.

INDIA—The first group of engineers and construction personnel are on their way to India to establish the offices of *Kaiser Engineers Overseas Corporation* at Calcutta and Jamshedpur. Kaiser has a contract with *Tata Iron & Steel Company* to design and build a $130,000,000 steel plant expansion unit at Jamshedpur. (See MINING WORLD, January 1956, page 67.) Construction operations will be directed from Jamshedpur, while material control will be handled in Calcutta.

ENGLAND—Production of tin concentrate at *South Crofty* mine in Cornwall has increased over the past few months, reaching nearly 70 tons per month. Work on the enlarged treatment plant which will treat 8,000 tons per month is progressing satisfactorily. Some of the equipment has been delivered, and additions to the buildings have been completed. *South Crofty Ltd.* also may install an HMS plant for pre-concentration later.

AUSTRIA—A deposit of manganese ore has been discovered by Dipl. Ing. Kirschwock near Hirschbichl, between Lofer and Berchtesgaden in the province of Salzburg. The ore contains 20 to 32 percent manganese. It will be developed by *Maximilianhutee*, Sulzbach/Rosenberg, Ober Pfalz, Germany, which is a rolling mill belonging to the Flick Concern.

GREECE—The nickel plant at Larymna set up by the *Greek Chemical Product & Fertilizer Company* at a cost of $7,000,000, will begin operation sometime this year. Initially it will produce nickel iron, but it is hoped that nickel steel production will be possible by the fall. An annual total of 150,000 tons of ore will be processes. An order for an electric furnace has been placed in Germany. The project is part of a larger plan for the development of the Ptolemais lignite with the aid of *Krupp* credits.

YUGOSLAVIA—Bauxite deposits have been discovered in Croatia near Drnis, Knin and Maslinice. Barite deposits have been found near Delnice and Topuski Gradac, also in Croatia.

ENGLAND—The *Weardale Lead Company Ltd.* operating at Weardale in northern England has had a difficult year. A large amount of development work was undertaken during this period, and during the second half lead recoveries were considerably lower. Exploratory work at *Wolfcleugh* proved certain values, but it has now been determined that the mine cannot be worked economically until it is electrified at a later date. Therefore, pumps have been withdrawn and machinery has been placed on a care and maintenance basis. Although some 2,000 tons of fluorspar were mined from the *Barbary* mine, considerable additional development work had to be undertaken from which favorable results are expected

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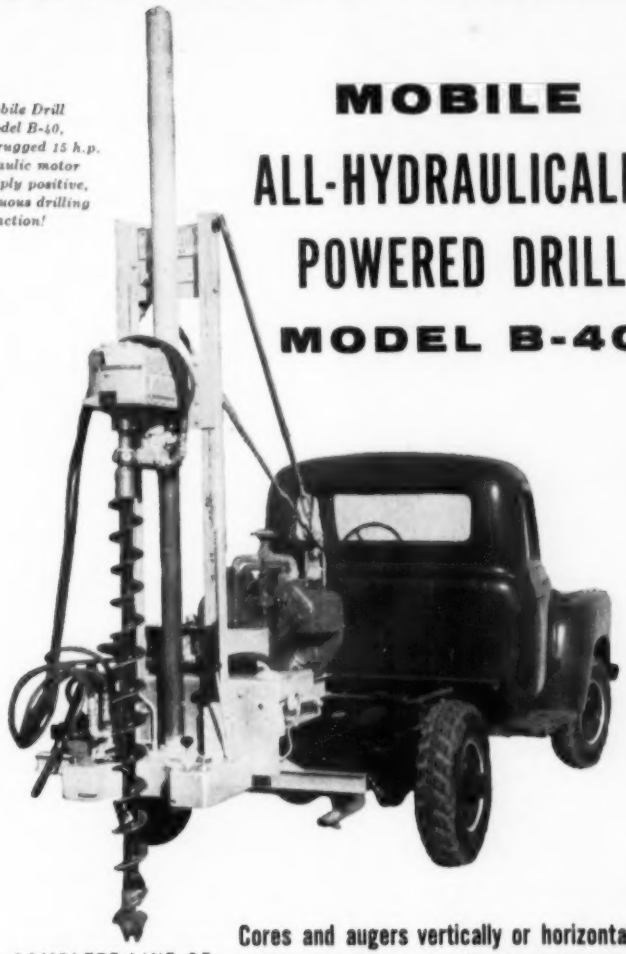

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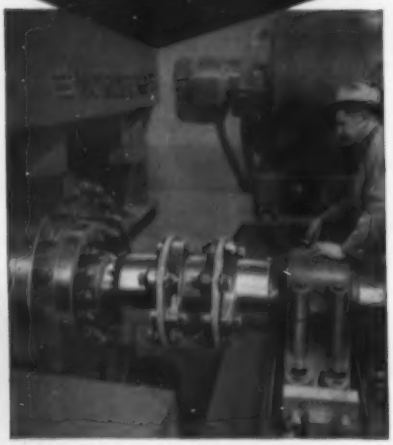

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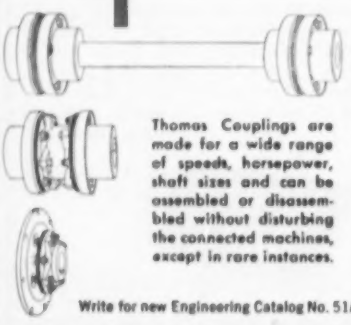

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this year. Investigation of lower levels at *Stotsfieldburn* mine initially proved to be disappointing because of the quality of the fluorspar, but there are now considerable quantities of indicated reserves from this development. A flotation plant was started, as planned, in July 1955 and it is only now coming into effective production, providing refined spar of highly satisfactory quality.

EIRE—An iron ore survey may be made of known deposits at Arigna Slieve, and Iarainn in County Leitrim. The County Council has requested the Irish Republican Ministry of Industry to conduct the survey but if the request is not granted, the Council indicates it will invite Swedish experts to undertake the project. A similar survey was made by a French firm some 20 years ago. At that time, the report was that iron ore seams did exist in these districts but they were uneconomical to develop. The County officials contend that the examination was not thorough and that no examination was made of the region where iron ore was successfully mined more than a century ago.

SPAIN—The Direccion General de Minas has authorized construction of a new mercury furnace in Mieres, province of Ovieda. The plant will be manufactured in Spain and is expected to be ready for operation before the end of this year. The nearby *La Peno* mines will supply the ore.

U.S.S.R.—There are indications that Russian production of titanium may be greater than that of the United States. Based upon a reported mine production of 2,000,000 tons annually of ilmenite-magnetite ore from northwestern Russia and the Urals, estimations of titanium output are set at between 90,000 and 95,000 tons per year. The mine figures were the indicated output in 1951, and metallurgists believe that approximately 360,000 tons of titanium could be produced from these ores, about 31.6 percent of which would be titanium metal. Allowing for waste, production could be about 95,000 tons. There is little doubt this exceeds the U. S. production of 7,361 tons in 1955; 1956 sponge capacity is 8,160 tons, and large expansion programs are underway.

POLAND—The new iron ore mine called *Malice* near Czenstochau, which was partly equipped by the Soviet Union, has started operation.

EIRE—During the December quarter, *Silvermines Lead & Zinc Company Ltd.* which operates properties in Tipperary County milled 17,522 long tons of ore producing 418 tons of 68 percent lead concentrate containing 34 ounces of silver per ton. A considerable amount of development, including sinking the main shaft to a total depth of 225 feet and excavating a pump chamber and ore bins, has been completed. Some geographical surveying has been carried out near the firm's *Shallee* property. Installation of an HMS plant has been started, and the modified plant should be in operation within the next few months.

AUSTRIA—Austrian iron ore reserves amount to between 350,000,000 and 400,000,000 metric tons, according to recent estimates. Only five of the 100 commercial deposits are being mined at present. The iron ore production of 1953 and 1954 was a little over 2,700,000 tons each, while in the first 10 months of 1955 production reached 2,600,000 tons.

GREECE — *Hellenic Company of Chemical Products and Fertilizers Ltd.* has increased chemical fertilizer output

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at its Piraeus plant from 60 to 100 tons a day as part of a government program to stimulate food production. A new 100-ton plant, presently producing ammonium phosphate but designed by Dorr-Oliver Inc. to manufacture either triple superphosphate or ammonium phosphate, has replaced the 60-ton installation designed by the same firm and initially put into operation in 1934. Raw material used is Gafsa phosphate rock imported from Tunisia.

YUGOSLAVIA—Deposits of barite and iron slag have been discovered at Maslovari on the Sava River. The slag deposits with over 50 percent iron content are estimated at nearly 500,000 metric tons, and the barite deposits at 35,000 metric tons. Barite mining has already started and the first shipment of 300 metric tons has been sent to the United States and Poland.

AUSTRIA—*VOeST*, the Austrian steel firm, reportedly is obtaining a part of its ore needs from North Africa. The firm is said to have contracted for 135,000 tons of iron ore via the ports of La Goulette and Benisaf.

WESTERN AUSTRALIA—*Norseman Gold Mines N.L.* reports a successful year in 1955 with a reduction in cost of 9 shillings per ton achieved by underground mechanization. Further cost reductions are anticipated in 1956 when the effects of a new heavy media separation plant are fully felt. As in recent years, the company is concentrating on its pyrite mining and did not explore for gold. Pyritic concentrates and some high-grade pyritic ore are marketed to sulphuric acid producers in Western Australia and the company can supply all of the state's requirements at a price competitive with imported sulphur. Norseman's power potential will be increased through the purchase of a power plant from the now closed *Big Bell* gold mine at Cue. Proved ore reserves are 2,167,000 long tons with probable ore reported at 1,668,000 tons. Sulphur content of production last year was 22,000 tons.

FIJI ISLANDS—*Emporor Gold Mining Company Ltd.* at Vatkuola, developing on the No. 12 level at the lowest levels in the mine to date, reports values up to 17 dwts. of gold. Average of reserves is 8.4 dwts.

WESTERN AUSTRALIA—The Western Australian Government, which had previously guaranteed financial assistance amounting to £150,000 to the *Sons of Gwalia Ltd* mine at Gwalia has increased the amount to £250,000 following collapse of the main shaft. This brought mine operations to a halt. In the last year the mine treated 107,852 tons for a recovery of 22,341 ounces of gold.

TASMANIA—*Mount Lyell Mining and Railway Company Ltd.* at Queenstown is driving a new 3,800-foot-long tunnel and ore pass to replace the present ore pass from the West Lyell open pit which is nearly worn out. This ore pass delivers to the level of the concentrator approximately 750 feet below the surface. The new arrangement is also expected to shorten this distance. A new 84- by 60-inch jaw crusher has also been purchased. The company has completed a geological investigation of the Jukes-Darwin area southwest of Mount Lyell but results were not promising.

NEW GUINEA—*Bulolo Gold Dredging Ltd.* at Wau expects to work out remaining reserves for its No. 4 dredge by mid-year. It is in virgin ground after passing through tailings for several months. The remaining dredges, No. 5 and 7, have sufficient reserves until about the middle of 1959. The Territory's gold production continues to decline and cannot be expected to improve as Bulolo is easily the largest producer.

REPUBLIC OF THE PHILIPPINES—In January 1956 *Baguio Gold Mining Company* milled 12,597 tons of ore to recover 2,734.71 ounces of gold. *Itogon Mining Company* milled 15,337 tons of ore for a recovery of 2,917.319 fine ounces of gold and 1,44.656 fine ounces of silver. *Atlas Consolidated Mining and Development Corporation* treated 153,620 tons of ore, a new high since operations started early last year, and a 17 percent increase over the previous month. Ore milled averaged 0.77 percent Cu and 0.01 ounce gold per ton. Copper concentrate produced for the month totaled 4,283 dry short tons, estimated to contain 1,802,581 pounds of copper and 535 ounces of gold.

INDONESIA—A new diamond mine is being developed at Gunung Bahan, Borneo, almost as large as that of the Lahung deposit on Barito. The diamond mine at Badan has closed for the present. Reportedly it could not survive the 60 percent decrease in the price of diamonds.

WESTERN AUSTRALIA—*North Kalgurli (1912) Ltd.*, which is registered in England, is considering the transfer of its headquarters to Australia. Several other companies have done this in recent years to gain tax savings. Consent of the United Kingdom Treasury is necessary. The mine treats about 350,000 tons of ore annually for a recovery of 75,000 ounces of gold, and is considered to have great potentialities for profit earning despite rising costs. Expansion of the Croesus treatment plant will require an expenditure of about £200,000, and the main shaft will be deepened a further 500 feet.

Australia's Beach Sands Important for Rutile

The increasing use of titanium as a strategic material has led to greater interest in rutile—the mineral from which titanium is largely produced. Australia's sandy beaches are of special importance because they are the world's largest source of rutile The map above shows Australia's principal beach sand deposits. At Dunwich, North Stradbroke Island, a new separation plant which will produce 12,000 tons of rutile annually is being operated by Titanium and Zirconium Industries Pty. Ltd., subsidiary company of Consolidated Zinc Ltd. The flowsheet includes high tension separation to give a rutile-ilmenite fraction and a zircon-monazite-silica fraction. Ilmenite is removed by roll-magnetic machines and rutile cleaned by electrostatic machines. Silica is tabled from the zircon fraction which is electrostatically and magnetically cleaned for sale. Feed to the separation plant is high-grade mixed mineral from the eastern beach of North Stradbroke Island. A new dredge with 110 Humphreys spirals will shortly begin working dune areas near the eastern beach. Dredge feed will be up graded by three-stage spiralling, final concentrate being pumped to a terminal of the new aerial tramway for transport in buckets a distance of seven miles across the island to Dunwich (see map). Capacity of the tram is 30 tons per hour. Eastern Titanium Corporation, Pty. reports it will mine rutile at Lake Munmorah between Sydney and Newcastle. A partnership known as Lennox Head Company has been organized to begin rutile production at Lennox Head. Shareholders are Uranium Consolidated N.L., Tungsten Consolidated Ltd., Lennox Sands Pty. Ltd., and H. D. L. Mining Company Pty. Ltd. Uranium Consolidated has a one-third interest. Western Australia, not shown on the map, is a recent comer in the titanium picture. Rock types here reportedly resemble those of Southern India and ilmenite has been found. Western Titanium N.L. has bought a property of about 100 acres known as Davies' Block adjoining the northeast boundary of other properties it holds. The new block is estimated to contain 750,000 tons of heavy minerals, principally ilmenite. The TiO_2 content is said to be similar to that at Manavalakurichi, Tranancore.

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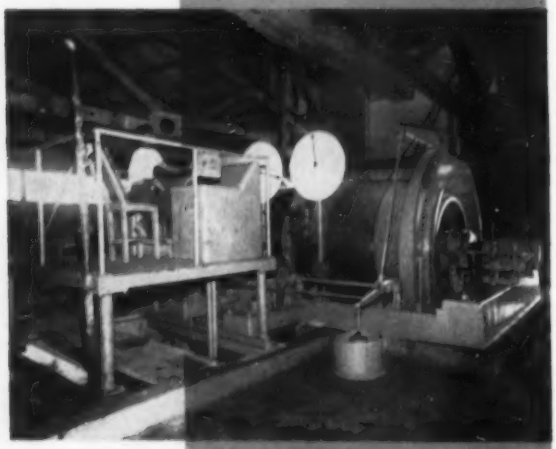

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ONTARIO—*American Smelting and Refining Company* has signed an agreement with *Lac de Renzy Nickel Ltd.* for the exploration and development of 24 claims located in the new Delahey Lake copper-nickel district of Pontiac County. The exploration program will be undertaken by an ASARCO subsidiary—*Asarco Exploration Company of Canada.* Under terms of the agreement, ASARCO will provide all funds required, and will be repaid from profits if the project is successful. Geophysical surveying has already started.

BRITISH COLUMBIA—*Sheep Creek Mines Ltd.* is enlarging its crushing facilities near Invermere. The new installation will provide as much mill feed in eight hours as in 24 hours with the old equipment. Current production from the firm's *Mineral King* lead-zinc mine is about 13,000 tons monthly. Stockholders recently voted to change the name from *Sheep Creek Gold Mines Ltd.* since the company has not produced gold for a number of years.

ALASKA—Ed Toussaint of Fork Yukon has purchased the first production model of a new gyratory ball mill which will be flown in to Chandalar at the head of Big Creek in time for the beginning of the summer mining season. The mill is expected to give a boost to the waning hard rock mining industry in Alaska. For the past five years, Mr. Toussaint has been sinking a shaft and driving two tunnels on a vein of quartz-gold at Big Creek. He plans to build three miles of access road this summer, as well as a small aircraft landing field. He does not expect to mine this summer, but to merely test run the mill, and hopes to go into production next spring.

BRITISH COLUMBIA—*Ainsworth Base Metals Ltd.* is giving consideration to reopening the *Ainsworth* base metal mine near Silverton. Meanwhile, it has staked 16 mining claims in the Highland Valley copper district north of Merritt. Also in this area, *Cassiar Consolidated Mines Ltd.* has purchased the *Jerusalem* group of claims, and has staked 15 adjoining claims. Early exploration is planned.

ONTARIO—*Nickel Rim Mines* plans an expansion program at its copper-nickel property 20 miles north of Sudbury. Current milling rate of about 800 tons per day will be increased to 1,000 tons by late August and 1,500 tons by the end of the year. Ball mills and classifiers have been purchased from *Jerome Gold Mines* and *Buffalo Ankerite Gold Mines,* together with a mill building from the latter. The present shaft deepening program is reported to be making good progress. The 583-foot shaft will be deepened to provide levels at 773, 923, 1,100, and 1,275 feet. A crushing station will be established below the 1,275-foot horizon.

NEW BRUNSWICK—*Anacon Lead Mines* has completed shaft sinking at its *New Larder* property south of Bathurst, and is preparing to begin lateral development. A station has been cut on the 1,450-foot level and there will be three others but the levels have not been determined yet. The shaft, a three-compartment unit, is 1,500 feet deep.

QUEBEC—*Quebec Chibougamau Goldfields* is preparing to start shaft sinking operations at its property at Dore Lake in the Chibougamau area of northwestern Quebec. The shaft will be three-compartment, and will be sunk to a depth of 1,000 feet. A plant will also be installed. Drilling has indicated about 1,000,000 tons of good grade copper-gold ore.

SASKATCHEWAN—*Gulch Mines* is preparing to deepen its shaft to 1,000 feet for three additional levels. The program will include 5,000 feet of lateral development and 15,000 feet of diamond drilling to develop a deeper block of ground which appears promising. The firm's uranium property is located at Lake Athabaska.

ALASKA—*United States Smelting, Refining and Mining Company* hopes to have seven dredges in operation this season. The newest is that purchased last year from *Livengood Placers*, and being moved to Bear Creek in the Hog River area. Operating at the start of this season will be dredge No. 2 at Fairbanks Creek, No. 4 at Dome, No. 6 at Gold Hill, No. 8 at Engineer, and No. 10 at Cripple Creek. A five-cubic-yard dragline will be set up at Chatanika. In the Nome area, the firm will operate two dredges. A third will be built and operated on a submarine bench. A new hull will be constructed and machinery will be installed from the dredge that capsized two years ago.

BRITISH COLUMBIA—*Kaslo Mines Corporation* plans to resume rehabilitation of its nine-claim property this spring. Work was started last fall but suspended for the winter. The claims are near Duncan Lake in the Ainsworth district, and values are in silver-lead-copper-gold.

UNION OF SOUTH AFRICA—*Riebeeck Gold Mining Company, Ltd.* has been formed to develop what is known as the Van den Heeversrust area immediately west of *Freddies Consolidated Mines Ltd.* in the Odendaalsrus sector of the Orange Free State goldfield. The proposed lease area will be considerably smaller than that of the average mine in that field. However, what is lacking in area is expected to be more than balanced by the high tonnages to be drawn from the multi-banded reefs of the Elsburg horizons; mainly in the western section. Substantial supplementary tonnages will be contributed by the Basal Reef, the "A" and "B" Reefs, and, to a slight extent, the Leader Reef.

FEDERATION OF RHODESIA & NYASALAND—Much excitement exists in the small mining town of Gatooma, Southern Rhodesia, over a reported find of nickel-bearing pyrrhotite discovered some 50 miles west of the town in the Ngondoma area. Already 48 blocks of claims have been registered by Mrs. Magdalena Leslie, a woman prospector and miner well known in the area. The mineral occurs disseminated in a gabbro dike stretching for several miles. The *Mineral Search of Africa Ltd.*, a subsidiary of the *Rio Tinto* group, has applied for exclusive prospecting rights for 18 months over an area of 90 square miles covering the claims and surrounding area. Geological reconnaissance and a diamond drill program are in progress.

TANGANYIKA—Mineral exports from Tanganyika in 1955 increased in value substantially to £5,086,661 from the 1954 figure of £4,605,471. Most of the increase was accounted for by the marked rise in exports of lead concentrates, the value of which rose from £396,879 to £790,000. The two other major mineral exports were diamonds and gold. Sales in terms of quantities reflected small declines in diamonds and gold; but marked increases were evident in gypsum, lead concentrates, magnesite, meerschaum, mica waste, salt, and tungsten concentrates.

FEDERATION OF RHODESIA & NYASALAND—It has been revealed that the price paid for the manganese property purchased by *Vanadium Corporation of America* in Northern Rhodesia (see MINING WORLD, November 1955, page 69) was £350,000 ($1,000,000). The development of this deposit and two other properties in the territory which are now producing good tonnages, is a direct result of the change in the policy adopted some three years ago by the owners of the mineral rights, the *British South Africa Company Ltd.*, which is now encouraging smaller entrants into the mining field.

UNION OF SOUTH AFRICA—The discovery of a diamond deposit on the farm Rusverby in the Zwartruggens area of the Rustenburg district, Transvaal, has been reported. *Mallin Mines*, a subsidiary of *Carrig Diamonds*, is developing a fissure in this same area.

SOUTH WEST AFRICA—*Industrial Diamonds of S.A. (1945) Ltd.* effected a general improvement in its operations in the final quarter of 1955. At the new Saddle Hill North diamond deposits in the Luderitz district, sand and gravel mined advanced to 11,237 loads from 10,860 loads; recovery increased from 4,713 carats to 5,702. *Lorelei Copper Mines Ltd.* in which Industrial Diamonds has an interest, has started production in its South West African mine.

FEDERATION OF RHODESIA & NYASALAND—Now that 1955 statistics are available for Northern Rhodesia, it is evident that there was what amounted to a claim staking rush during the year. In 1954, 77 mining titles were registered including 20 special grants; last year's figures were 1,127 titles registered and 30 special grants. The large increase in registrations took place immediately before considerable areas of the country were closed to general prospecting.

UNION OF SOUTH AFRICA—*Middle Witwatersrand (Western Areas) Ltd.* has increased its option holdings from 47,520 to 102,240 claims in the Boshof and Hoopstad districts, to the west and southwest of the Odendaalsurus goldfield in the Orange Free State. In addition, options have been acquired over 97,920 claims in the general vicinity of Leslie, west of Kinross, and Delmas, northwest of the same point; and in the Standerton district of the south.

FEDERATION OF RHODESIA & NYASALAND—While on a prospecting-game survey safari in some of the least accessible areas of the lower Zambesi, Newby Tatham, manager of *Rhodesia Mica Mining Company (Private) Ltd.* (Southern Rhodesia) stumbled over a hitherto unmapped basic intrusion. He

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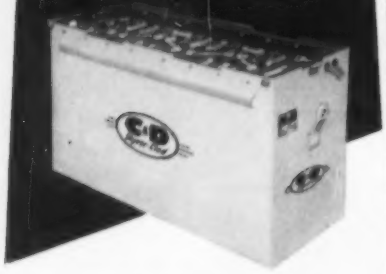

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was accompanied by J. Wiles of the *Southern Rhodesia Geological Survey* who identified the rocks as being of similar composition and possibly of similar age to the 300-mile-long Great Norite Dyke of Southern Rhodesia, parent body of the chromite. A quick reconnaissance of the area was made before the advent of the rains. While the area is now virtually inaccessible, even by river, Rhodesian miners are keenly awaiting results of the airborne magnetometer survey now under way. Since the dyke is overlain by recent karroo system sediments, it is anybody's guess whether platinum, nickel, and allied minerals may exist.

NIGERIA—It has been known for some time that ore reserves of *Jos Tin Area (Nigeria) Ltd.* will be depleted within the not too distant future and that, of course, production will continue to drop. The fact that the rate of decline has been more gradual than expected is a result of careful and successful management, and everything is being done to work the remaining ground efficiently.

GOLD COAST—*Taquah and Abosso Mines Ltd.* has officially confirmed that mining operations will cease permanently and the mine will be allowed to fill with water. This development has resulted from the eight-week-old strike of African workers on the Gold Coast in support of a 15 percent increase in basic wages. The company feels it is no longer in a financial position where it can bear the cost of keeping the mine open under the present cost structure in view of the fact that cash resources have been exhausted. Any capital return will depend entirely upon the sale of the company's assets.

PERU—*Standard Ore and Alloys Corporation* (New York) reports the return of its exploration teams after several months of intensive work on its *Landa* properties near the Colpe River in the Cusco area. Torrential rains have made further work impossible for another few months so the temporary camps have been discontinued. Preliminary reports are said to show about 9,500,000 tons averaging 3.5 to 4.0 percent Cu. An additional 1,500 hectares have been staked to protect any possible extension of the ore body. Additional studies will be made later in the year to give a clearer picture of the ore reserves.

ARGENTINA—*St. Joseph Lead Company* reports the receipt of a dividend amounting to $754,000 from its Argentine affiliate, *Cía. Minera Aguilar, S. A.* Dividends from this subsidiary have been restricted for some years because of foreign exchange regulations. The last payment was received in 1952—$69,874.

JAMAICA—*Jamaica Mines Ltd.* announces an expansion program will be undertaken at its plant at Lydford, Saint Ann. An additional rotary kiln will be built at the plant site for drying of bauxite, a second overhead trolley will be installed for transportation of ore to the company's port at Ochorioa, and enlarged storage facilities will be erected at the port for ore awaiting trans-shipment. The present facilities have been in operation since 1952.

MEXICO—Silver production for 1955 totaled 45,000,000 fine ounces. Of this, 40,000,000 ounces were exported; 17,200,000 ounces went to Saudi Arabia in the form of coins minted in Mexico, and 13,900,000 to Western Germany. The Bank of Mexico has announced that during 1956 Mexico will again sell West Germany more than 13,000,000 fine ounces of silver, valued at $12,500,000.

PERU—Iron ore production from the *Marcona Mining Company's* operations near the Port of San Juan is expected to increase during 1956. Shipments to the United States and elsewhere in 1955 averaged around 150,000 metric tons per month. These are to be increased to about 225,000 tons per month during this year. Total production from Marcona during 1955 was 1,737,823 tons. Shipments this year will include about 50,000 tons monthly to Germany, with the balance going to the United States. Marcona also will supply the steel plant at Chimbote when it goes into operation. Utah Construction Company and Cyprus Mines Corporation are partners in this venture.

COLOMBIA—*Pato Consolidated Gold Dredging Ltd.* dredged 26,836,000 cubic yards in 1955 to recover 160,891 ounces of fine gold, compared with 26,830,100 cubic yards in 1954 to recover 190,456 ounces. *Asnazu Gold Dredging Ltd.* dredged 1,246,240 cubic yards in 1955 to recover 12,663 ounces of fine gold, as compared with 2,108,300 cubic yards in 1954 to recover 11,876 ounces.

BRAZIL—Important deposits of radioactive monazite are reported to have been discovered on the boundary between Brazil and British Guiana. The discovery was announced by Dr. Ernest Pollard, director-in-charge of the Geological Researches of British Guiana. United States companies are said to be prospecting in the region.

MEXICO—Two United States mining men have reported the discovery of tin deposits near Cienegas de Batres in Durango municipality. The men are C. Patten Jones and William G. Pickens, who say they plan to file claims to the deposits. Mexican capital is reportedly interested in organizing a company to mine the deposits.

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U.S.A. Metal & Mineral Prices

METALS

		March 16, 1956
COPPER:	**Electrolytic.** Delivered F.o.b. cars, Valley basis	46.00¢
	Lake. Delivered, destinations, U.S.A.	46.00¢
	Foreign Copper. Valley basis	46.00¢
LEAD:	**Common Grade.** New York	16.00¢
ZINC:	**Tri-State Concentrates,** jig, flotation 80% lead, per ton	$201.75
	Prime Western: F.o.b. E. St. Louis	13.50¢
	Prime Western; Delivered, New York	14.00¢
ALUMINUM:	**Tri-State Concentrate,** 60% zinc, per ton	$89.00
ANTIMONY:	**Primary 30 Pound Ingots (99% plus).** F.o.b. shipping points	24.40¢
BISMUTH:	**Lone Star Brand.** F.o.b. Laredo, in bulk	33.50¢
CADMIUM	(In ton lots) price per pound	$2.25
COBALT:	**Sticks and bars.** 1 to 5 ton lots (Price per pound)	$1.70
COLUMBIUM:	**97-99%,** keg of 550 pounds (Price per pound)	$2.60
LITHIUM:	**Powder** Nom., per pound	$119.25
MAGNESIUM:	98% (per pound)	$11.00-$14.00
MERCURY:	**Ingots (99.8%)** F.o.b. Valasco, Texas, per pound	32.50¢
NICKEL:	**Flasks.** Small lots, New York	$262.00-$265.00
SELENIUM:	**"F" Ingots (5 pounds).** F.o.b. refinery, Port Calbourne, Ontario	64.50¢
THORIUM:	**99.5%**	$13.50-$15.50
TIN:	**per kilogram:**	$43.00
TITANIUM:	**Grade A. Brands.** New York (Price per pound) Prompt delivery	$1.02
URANIUM	**99.3%** + Grade "A" (Price per pound)	$3.15-$3.45
U-235:	**Nominal per kilogram**	$40.00
GOLD:	**Nominal**	$11,000.00
SILVER:	**United States Treasury Price**	$35.00 per ounce
	Newly mined domestic. United States Treasury price	90.50¢ per ounce
PLATINUM:	**Foreign** Handy Harmon	91⅛¢
ZIRCONIUM:	**Per Ounce**	$97.00-$107.00
	Sponge, Per Pound	$10.00

ORES AND CONCENTRATES

BERYLLIUM ORE:	**10 to 12% BeO. F.o.b. mine, Colorado**	$47.00 per unit
	Small lot purchases at Custer, S. D., Spruce Pine, N. C., and Franklin, N. H. Visual inspection at $400.00 per short ton or by assaying at: 8.0 to 8.9% BeO, $40 per unit; 9.0 to 9.9%, $45; over 10.0%, $50.	
CHROME ORE:	F.o.b. railroad cars eastern seaports. Long tons dry weight.	
	African (Rhodesian). 48% Cr_2O_3. 3 to 1 Ratio	$44.00-$45.00
	African (Transvaal). 48% Cr_2O_3. No Ratio	$31.00-$32.00
	Turkish, 48% Cr_2O_3. 3 to 1 chrome-iron ratio	$52.00
	U. S. Government ore purchase depot Grants Pass, Oregon, Base price, lumpy ore, $115.00; fines and concentrates $110.00 for 48% Cr_2O_3 and a 3 to 1 chromium-iron ratio. Premiums for higher grade ore and for a ratio up to 3.5 to 1. Penalties for grades down to 42% Cr_2O_3.	
COLUMBIUM-TANTALUM ORE: IRON ORE:	At United States small lot beryl purchase depots. $3.40 per pound contained combined pentoxides in 50% ore. Includes 100% bonus. (Government stopped buying temporarily May 12)	
	Lake Superior. Per gross ton Lower Lake Ports	
	Mesabi, Non Bessemer, 51.5% Fe.	$10.85
	Mesabi, Bessemer, 51.5% Fe.	$11.00
	Old Range Non Bessemer.	$11.10
	Old Range Bessemer.	$11.25
MANGANESE ORE:	**Swedish,** Atlantic Ports, 60 to 68% Fe. Contracts, Per Unit	22.00¢
	Metallurgical grade. 48 to 50% Mn. Long ton unit	$1.25
	Metallurgical grade. 46 to 48% Mn. Long ton unit	$1.15
	Metallurgical grade. 45 to 46% Mn. Long ton unit	$0.95
	Chemical grade. 80% MnO_2. Per Ton	$70.00
	Domestic U. S. Government ore purchasing depots: Butte, Montana; (black and pink ores) base price of $4.87 per long dry ton of 18% manganese ore, Phillipsburg, Montana; base price of $6.43 per long ton unit of 15% manganese ore. Small lot program f.o.b. railroad cars, minimum 40% Mn. Base price (48%) $2.30 per unit with premiums and penalties.	
MOLYBDENUM CONCENTRATE:	**90% MoS_2 F.o.b. Climax, Colorado. Per pound of contained** molybdenum, plus cost of containers	$1.10
TUNGSTEN CONCENTRATE:	**Domestic.** 60% WO_3 Per short ton unit	$63.00
	Foreign. 65% WO_3 Per short ton unit (Scheelite)	$33.00
	Foreign. South American, Spanish, Portuguese	$33.00
URANIUM ORE:	**Carnotite-Roscoelite.** F.o.b. purchase depot plus $0.06 per ton mile ($6.00 maximum), Grand Junction, Rifle, Durango, Naturita and Uravan, Colorado Salt Lake City, Marysvale, Thompsons, Moab, White Canyon, Green River, and Monticello, Utah. Shiprock, and Bluewater, New Mexico, Edgemont, S. Dakota, Riverton, Wyoming, Tuba City, and Cutter, Arizona. Base price for 0.10% ore is $1.50 per pound and up to $3.50 per pound of contained U_3O_8 plus $0.75 per pound for each pound in excess of 4 pounds per short dry ton and an extra allowance of $0.25 per pound for each in excess of 10 pounds. A $0.50 per pound development allowance paid on all ore purchases. At Shiprock all ores with more than 6% lime are penalized for excess lime. At Monticello ores will be paid for in accordance with metallurgical characteristics.	
VANADIUM ORE:	**Carnotite-Roscoelite.** V_2O_5 in ratio of more than 10 parts to 1 part of U_3O_8 are generally acceptable at all AEC depots, but excess not paid for at Marysvale, Monticello Shiprock, and Bluewater ..... Per Pound V_2O_5	$0.31

NON-METALLIC MINERALS

BENTONITE:	**Minus-200-mesh.** F.o.b. Wyoming points. Per ton in carload lots	$12.50
	Oil Well grade. Packed in 100 pound paper bags	$14.00
FLUORSPAR:	**Metallurgical grade. 70% effective CaF_2 content per short ton F.o.b.** Illinois-Kentucky mines	$32.00-$35.00
	Mexican. 70%, f.o.b. border	$24.00-$24.50
	European, Atlantic Ports, 70%	$33.00-$34.00
	Acid Grade. 97% CaF_2 F.o.b. Kentucky, Illinois, Colorado	$47.50-$50.00
PERLITE:	**Crude:** F.o.b. mine per short ton	$3.00 to $5.00
	Plaster grades. Crushed and sized. F.o.b. plants	$7.00 to $9.00
SULPHUR:	Long ton, F.o.b. Hoskins Mound, Texas	$25.50
	Export	$30.50

LONDON METAL AND MINERAL PRICES

		Per Long Ton		March 16, 1956 USA Equivalent cents per pound[1]
COPPER:	Electrolytic spot	£429	0s 0d	53.62¢
LEAD:	Refined 99%	£121	0s 0d	15.12¢
ZINC:	Virgin, 98%	£102	10s 0d	12.81¢
ALUMINUM:	Ingot, 99.5%	£179	0s 0d	22.375¢
ANTIMONY:	Regulus, 99.6%	£210	0s 0d	26.25¢
TIN:	Standard, 99.75%	£827	10s 0d	103.44¢
TUNGSTEN:	Long ton unit, 2705	$37.80 per long ton unit		

1. With Sterling pound at $2.80.

Quotations on metals and certain ores through the courtesy of *American Metal Market*, New York, N. Y.

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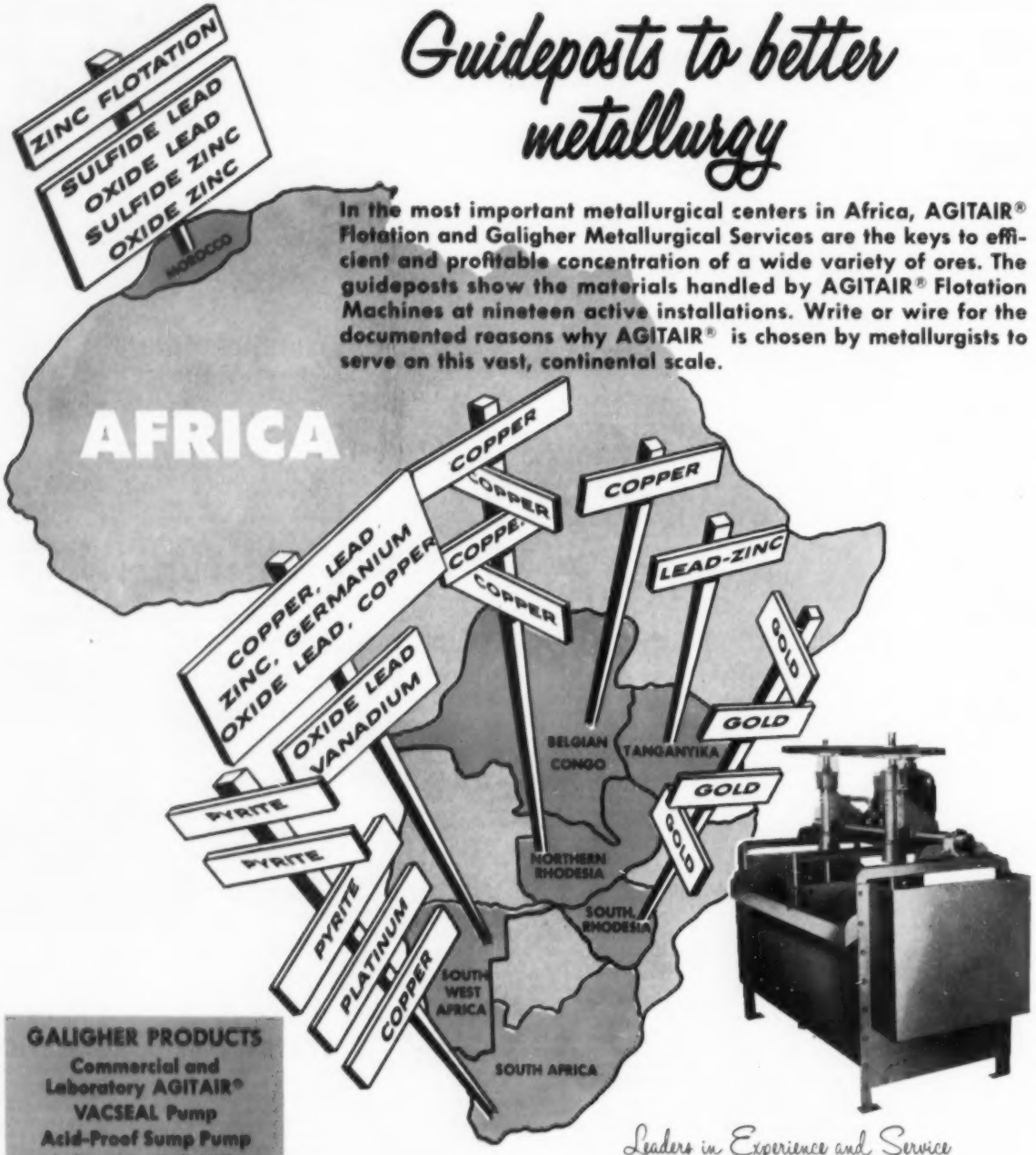

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Newsmakers

Continued from page 58

sulting geologist; **M. M. O'Brien,** Bralorne Mines Ltd.; **Christopher Riley,** consulting geologist; **James S. Scott,** Northwestern Explorations Ltd.; and **L. F. Wright,** metallurgical engineer. As immediate past president of the Chamber of Mines, **S. J. Crocker,** British Columbia Equipment Company Ltd., becomes a member of the board. **Andrew Baird,** representing the Dawson, Yukon Territory Chamber of Mines; **Gordon Lee,** representing the Whitehorse, Yukon Territory Board of Trade; and **H. E. Doelle,** representing the Chamber of Mines of Eastern British Columbia at Nelson are also members of the executive committee.

F. T. Hartland, secretary of Ruston-Bucyrus, has been appointed to the board of the company and will also continue his duties as secretary.

J. C. Richards and **O. V. G. Hoare** have resigned from the board of Gold and Base Metal Mines of Nigeria. Mr. Richards has also given his resignation to the board of East Rand Consolidated.

Sir Ernest Lever, chairman of Richard Thomas and Baldwins, succeeded **A. G. Stewart** as president of the British Iron and Steel Federation on January 1, 1956. Appointed president-elect for 1956 was **Sir Andrew McCance,** deputy chairman and joint managing director of Colvilles.

J. M. F. Phillimore has joined the board of President Brand Gold Mining. His alternate is **G. W. H. Relly.** Mr. Phillimore has been appointed alternate director to **W. D. Wilson** on the board of Free State Geduld Mines, alternate director to **H. G. McKerrow** on the board of President Steyn Gold Mining, and alternate to **M. W. Rush** on the Welkom Gold Mining board.

The British Columbia Office of the Geological Survey of Canada is now located in Room 102, Winch Building, 739 West Hastings Street, Vancouver 1, British Columbia.

Lord Rathcavan has relinquished the chairmanship of the St. John d'el Rey Mining Company, England, and is succeeded as chairman by **Lord Remnant.** Lord Rathcavan will remain on the board.

L. C. Walker, deputy chairman, has resigned from the board of Gold Coast Main Reef, Limited, a London organization operating in the Tarkwa District, Gold Coast Colony, West Africa.

W. W. Wiltsey has been elected president of the Northwestern Quebec Prospectors Association. **J. J. Martel** has taken over as vice-president, **W. Leamy** as secretary, and **L. T. Garon** as treasurer. Directors who represent the association's branches in Rouyn-Noranda, Amos, Chibougamau and Val d'Or are **W. W. Beaton, H. Philippon, A. G. Morrison, M. Charest, J. Kyle, J. Lusko, W. Thompson, R. Roux, T. Aldous, J. Gelinas, N. Bidgood, F. Doody, L. Smith,** and **G. Paquette.**

Claude K. Howse has resigned as deputy minister of mines in Newfoundland to become resident geologist for British Newfoundland Corporation in Newfoundland. He is succeeded by **Frederick Gover,** former chief of the Newfoundland branch of the Canadian Institute of Mining and Metallurgy.

Gold Miners Win

Continued from page 54

of damages will be the subject of further proceedings before Hearing Commissioners of the Court of Claims in the event the present favorable decision becomes final.

The measure of damages—that is, the items for which compensation will be paid—is largely a matter of conjecture, but it would appear, at the present, that claimants will be awarded the amount of their proved losses, including the cost of closing down their operation, maintenance expenses during the period of closure from the time they actually closed down in the fall of 1942 to the date of the revocation of the Order on June 30, 1945, and any actual loss or depreciation in the value of machinery or equipment. It is anticipated that claims will also be asserted for loss of all profits which can be reasonably established during the period of enforced suspension of operations; the cost of reopening in those cases where the mines were reopened; and, where the total investment was lost as a result of L-208, strenuous efforts will doubtless be exerted to recover the entire amount. Further, awards granted will bear simple interest from June 30, 1945.

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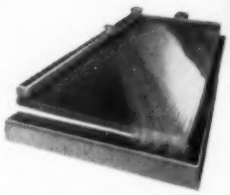
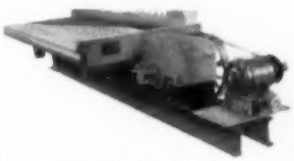


No. 6 Wilfley Table with variable speed V-Belt motor drive

No. 11-D Wilfley Table showing concrete foundations



No. 12 Wilfley Table with variable speed V-Belt motor drive

No. 13 Spec. Wilfley Table with overhead Lamp, as Flotation Pilot Table

The **genuine WILFLEY TABLE,** as manufactured by Mine & Smelter, has been an important factor in the success of many metallurgical processes for years. There are still many applications where the Wilfley Table is of particular value and cannot be equalled for economical and efficient performance. Some of these are . .

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- **In metal and reclamation plants.**
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WRITE FOR CATALOG

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Silver Bell

Continued from page 44

tailing, is circulated back to the two 100-foot thickeners.

The recleaned concentrate is sampled by a Denver automatic sampler, thickened in a 60-foot Dorr thickener, and then pumped to the filter house.

Filter Cake to Trailers

The filter house was designed for loading truck trailers with the cake as it is discharged from the 6-foot diameter 8-disc Oliver filter. The trailers can be spotted below the concentrate conveyor by means of a rope and winch. The tractors periodically pick up a loaded trailer and haul the concentrate 25 miles to the Plata railroad siding. The concentrates are shipped to El Paso, Texas for reduction in ASARCO's copper smelter. Each carload of concentrate is coated with a lime slurry to prevent dusting during the trip to El Paso.

Water

Approximately 80 to 85 percent of the water in the mill tailing is reclaimed. Fresh water is supplied from three wells nearly 9 miles away in the Avra Valley. The water is pumped by radio controlled booster pumps to the mill water reservoir which has a 1,000,000-gallon capacity.

Tailored Pulp for Cleaners

The hydroseparator which makes the sand-slime separation of the rougher concentrate was placed in the circuit to bring the Dorrclone feed to the proper density and to improve the control of the density and fineness of the feed to the cleaners.

The Silver Bell flowsheet has the advantage of providing a tailored product for the first cleaner cells. The coarse fraction in the rougher concentrate is routed through the regrind circuit liberating copper mineral still locked with the gangue. A certain amount of the overflow from the rougher concentrate hydroseparator goes to the 100-foot thickeners. The balance can be fed directly to the cleaner cells along with the Dorrclone overflow and thickener underflow for regulation of the solids content of the pulp entering the cleaners.

A separate building provides the storage for all reagents and reagent mixing facilities for the mill. Lime in slurry form is piped to the primary grinding section from this building. Other reagents used include pine oil, Dow Chemical Company Z-11, which is added to the head end and the fifth cell of the rougher section, Aerofloat 238, fed to the primary and regrind ball mills, and Dowfroth 250. Approximately 80 percent of the total copper is recovered from the ore. The Silver Bell mill produces about 250 tons of 25 percent copper concentrate daily.

Tailing Disposal

Tailing is discharged from the 275-foot thickener at approximately 44 percent solids and flows through 16-inch transite pipe placed on 0.71 percent grade to a Y. From this Y the tailing can be conducted through transite pipe to either the main or lower dam, or the subsidiary or upper dam. Due to the fact that the Silver Bell tailing does not naturally form well consolidated tailing banks, most of the lifts thus far have been made with fill or with barrow material, but experiments with cyclones are leading the way to a relatively new method of building tailing dams.

Water that accumulates in the tailing pond is removed by means of decant towers and concrete underdrains to a water sump situated below the main dam. From this point the water is pumped back to the million gallon reservoir for re-use.

Hecla U_3O_8

Continued from page 51

Junction Steel, then erected by W. R. Hall Company. Two air-controlled gates are provided on the bin, and two V-200 Syntron vibrators have been installed. The vibrators operate automatically when the gate is opened.

Re-worked Hoist

Ore is hoisted in two 50-cubic-foot, 2¼-ton Kimberley,type skips operating in balance. These two units, along with cages and dump irons furnished by Ogden Iron works, were installed during the latter half of September 1955. A used Vulcan Denver No. 60 double-drum hoist was purchased and spotlessly cleaned by Hecla personnel for hoisting men, supplies, and ore. The drums are 42-inches in diameter, have a 24-inch grooved face, and are powered by a Western Electric Company 100-horsepower induction motor. Rope speed is rated at 420 feet per minute, which gives sufficient hoisting capacity to handle a 250-ton-per-day mine production quite easily. It is anticipated that the unit can handle up to 400 tons per day if necessary.

Starting with this basic unit, a Lilly hoist control was installed by Hecla personnel who then added still another safety feature—a mechanical interlock between brake and clutch. With the latter device it is impossible for the hoistman to disengage the clutch until the brake on the drum has been set.

Power

At the time of MINING WORLD's visit, power was furnished by three Caterpillar Tractor Company D 13000 Diesel-generator sets rated at 100 kilowatts each. Utah Power and Light Company has a new power transmission line going into Monticello, and a branch has now been routed through the Big Indian Mining District to serve the uranium producers. The transmission line has carried 12,840-volt power to the mine since October 20, 1955. Hecla built a substation which included two banks of transformers. One bank delivers 440 volt, 3 phase, 60 cycle current to the hoist, compressor and the surface plant. The second bank delivers 2,300 volt, 3 phase, 60 cycle power through a V/C armoured, lead-covered, shaft feeder cable to the underground substation on the 6,260 level.

Air is furnished by the Ingersoll Rand 90-B stationary compressors which will supply 515-cubic-feet of air per minute. Space has been left in the compressor house for the installation of third unit after full-scale production starts if necessary.

The shaft collar is at an elevation of 6,850 feet, so compressor capacity must be large.

Spare Parts

A well stocked warehouse is the goal of the supervisors, and they have built up a good inventory of parts in the adjoining clerk's office. This is doubly important, because communications out of Moab are poor and distances to major supply centers long. As soon as a part is withdrawn, one of the clerks will place the name and model or descriptive number of the item in question in an order file. Replacement supplies are then automatically re-ordered.

For housing key personell the company has acquired 32 lots in Moab and constructed 15 houses. These include eight 3-bedroom homes and seven 2-bedroom units. The homes were erected by a local contractor.

Superintendent of the Radon operation for Hecla is Bill Love. Jim Greenslade is the mine engineer, Grant Eslick, the mine foreman, and C. A. Keating the office manager.

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Long-lasting oil clutch—can give you 1500 hours without clutch adjustment. Clutch fade is greatly reduced, and facings, which are bathed in oil, wear an average of only 2½ thousandths of an inch per 1000 hours of operation.

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99% OF ALL CAT MOTOR GRADERS ARE STILL IN USE

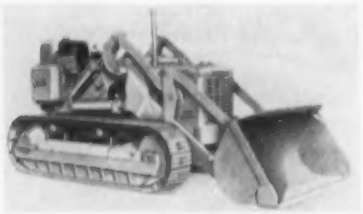
PRODUCTION EQUIPMENT PREVIEW

PEP is just what new equipment, increased mechanization, and new methods can give to your mine, mill or smelter. This PEP section is MINING WORLD's way of making available to you some of the finest current information on mechanization.

New Type Dry Concentrator Makes Mica Separation

A new dry separator for minerals has recently been developed by the Clute Manufacturing Company, of Rocky Ford, Colorado. To date it has worked successfully on Mica. According to the manufacturer a 98% recovery is being made from 12% heads. Tests have shown the machine can effect a recovery of minerals with a specific gravity difference of 0.8.

Capable of handling large volumes, the machine is quite simple and contains few moving parts. The air used to affect recovery uses both straight and cyclonic motions. The products to be separated enter a separating tube, where minerals of different specific gravity are separated by different currents of air. Circle No. 78 for additional information.



Newest and Largest Cat Traxcavator Available

The advantages of integral tractor and shovel design have been incorporated in the newest and largest Traxcavator in Caterpillar Tractor Company's expanding line of tractor-shovels, the new 100 hp No. 977 Traxcavator.

Features include unit design, 2¾-cubic yard bucket with 40° tip-back at ground level, good horsepower-to-weight ratio, advanced hydraulic system, large lifting capacity, good balance and stability, improved operator convenience and visibility, fast response to controls, in-seat starting, and oil flywheel clutch. Circle No. 74 for further details.

New Thor Rock Drill Now In Production

A new version of its Model 75 rock drill has been put into production at its Los Angeles plant, by the Thor Power Tool Company. To be known as Model 77, the new air-operated tool features a positive lock when pulling drill steels if mounted on a sinker leg.

Like its Model 75 counterpart, the new rock drill, which weighs 55 pounds, is designed for drilling holes up to 20 feet deep in hard-type rocks. Its rugged construction fits it for such heavy-duty assignments as shaft sinking, quarrying, road building and all general rock removal tasks where fast footage is an important consideration. Circle No. 76 for further information.

Linde Introduces New Welding Blowpipe

A new medium-pressure oxy-acetylene blowpipe, the Oxweld W-45, has been introduced by Linde Air Products Company. The W-45, with 18 welding head sizes, 8 multi-flame heating heads, and 8 extensions, offers the greatest welding and heating range (two through 300 cu. ft. per hr.) ever available in a single hand-welding blowpipe.

Stainless steel, used extensively for strength and durability, also acts to retard heat conduction to the handle and internal parts. Thus the handle of the blowpipe remains relatively cool and comfortable to the touch, even after sustained periods of continuous welding or heating. Circle No. 77 for additional information on the W-45.

New Detection Instruments Have Greater Sensitivity

The R7 Series of uranium detectors will detect radiation intensity changes down to less than one-hundred-thousandths (.00001) MR/HR according to the manufacturer, Nucleonic Co. of America. The heart of the new instruments is a Multiplier tube, which, when used in multiples, provides sensitivities far in excess of scintillation counters.

The multiplier tubes eliminate many disadvantages of the scintillation counter. They are not affected by temperature changes, electrical or magnetic fields, or rugged usage. Five models are available. Circle No. 72 for complete information and prices.

Drill-Bit Manufacturer Announces Expansion

Brunner & Lay, Inc., drill-bit manufacturers with offices in Franklin Park, Illinois, have announced a $1,000,000 expansion program designed to keep the companies abreast of the ever growing mining industry. The program of the companies, whose president is Fred J. Brunner, will include a new plant location, a new plant at an existing location, building additions at existing locations and the purchase of adidtional production equipment.

A NEW 900 CFM ROTARY Portable Compressor has recently been announced by the Ingersoll-Rand Company. With the addition of this new size, the Gyro-flo line of rotary portable compressors has been increased to five sizes—125 cfm through 900. For further information on this compact, high-volume air producer, circle No. 3.

BELT FASTENERS: Flexco Belt Fasteners and Rip Plates for heavy conveyor and elevator belts make tight butt joints of great strength and durability. The fasteners trough naturally, and operate smoothly through take-up pulleys. Flexco rip plates are for bridging soft spots and Flexco fasteners are available for patching or joining clean straight rips. Bulletin F-100 is available for your inspection. Circle No. 4.

FLEXIBLE COUPLINGS: Thomas Flexible Couplings for power transmission avoid costly shut-downs. Patented flexible disc rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float. Circle No. 5 and receive the new Thomas Engineering Catalogue.

RUGGED LABORATORY EQUIPMENT: Sturtevant crushing and grinding equipment is built to withstand rugged work—so much so that it is used in regular plants for round-the-clock operations. The exclusive "open-door" design makes cleaning and maintenance between sample runs quick and easy. For further information on Sturtevant Laboratory Equipment, circle No. 6.

NO NEED FOR OVERSIZE PUMPS or motors when you use Allen-Sherman-Hoff Hydroseal sand pumps. Because their close clearances are protected by seal liquid, they hold initial high efficiency up to the moment the Maximix Rubber part needs replacement, eliminating extra power costs for oversized equipment. The Hydroseal Catalog No. 953 describes the many advantages offered by A-S-H pumps. Circle No. 7.

DIAMOND BIT CATALOG: Diamond Tool Research Co., Inc. of N. Y. has a 4-page catalog covering its complete line of diamond drill bits and reaming shells available for interested readers. Diamond Tool, a prime importer of diamonds, also offers a rapid resetting service. Details, specifications, and prices are included. Circle No. 8.

EXPLOSIVE BROCHURE IN SPANISH: Hercules Powder Co. has recently completed an 8-page brochure covering the various grades and types of its explosives and blasting supplies. Written in both English and Spanish, the brochure is designed to help select the proper explosive to give maximum efficiency. Circle No. 9.

CABLE TOOL USERS will be interested in a reprint of an article entitled "The Care and Use of Cable Tool Joints" which is available from Spang & Co. The article points out that a substantial portion of the cost of drilling is represented in the unnecessary failure of tool joints in use. All operators of churn drilling equipment will want a copy of this article to learn how to prolong the life of their cable tool joints. Circle No. 10 for your free copy.

IDLERS WITH FLEX APPEAL: The new Joy LIMBEROLLER is a flexible, 2-bearing suspension idler for above or below ground belt conveyors. It consists of a series of pressure-moulded neoprene discs, moulded to a neoprene-sheathed, flexible steel cable. Suspended from two cadmium-plated, double row ball bearings, the LIMBEROLLER provides a load-conforming catenary. Self-cleaning, the new idler is about 1/3 as heavy as a 3-roll steel idler and will carry the loaded belt without slipping, bumping or splice damage. A 4-page bulletin (LD-103) is yours for the asking. Circle No. 11.

IDEA-PACKED STEEL BOOKLET: United States Steel offers a 42-page booklet packed with useful information for users of alloy steel. It will give you the mechanical properties and show you when to use T-1 steels for mining, earthmoving, milling, and crushing equipment to reduce costs and maintenance. Technical data on welding, gas cutting, cold forming and bending, and machining is also given. Circle No. 12.

LOW-COST DRILLING is yours with the new Mobile Drill Model B-40. This rig can be operated with one man, and easily mounts or dismounts on the front, rear, or side of all vehicles, including wheel or crawler tractors. Cores with water or air to 200 feet, augers to 75 feet. Circle No. 13 for complete information.

REMOTE CYLINDER CONTROL with Ledeen power operated valves. Instant action of remotely located or automatically operated cylinders is made possible with the new and improved Ledeen valves. These disc-type valves are positive in operation, and are readily adaptable to a wide variety of pilot controls. Bulletin 1010 will give you complete information. Circle No. 14.

QUICK OPENING sheave blocks by Joy, are described in their new bulletin 46-8. The Joy Sheave Block features an exclusive non-removable locking pin that can't loosen and fall out when locked in place. Other features are built-in lubrication, large throat opening, quick-opening snatch block construction. Send for your bulletin, circle No. 15.

AUTOMATIC FEED CONTROL: Syntron Vibratory Feeders assure instantly controllable feeding rates from a few pounds to hundreds of tons per hour. For either automatic or semi-automatic feeding of bulk materials from fine powders to heavy lumps. Feeders and other Syntron products are featured in their new catalogue which is yours by circling No. 16.

THE LAST WORD in simplicity. A wholly new approach to HMS. From top to bottom, the OCC Vessel is specifically designed to take advantage of the simplicity of the HMS process. The result is optimum metallurgical performance and trouble-free operation. A complete bulletin on this subject is available by circling No. 17.

MEASURE DRILLING SAVINGS by the foot. Field results using the new McCarthy Heavy-Duty Vertical Auger Drill have given operators lower cost per foot than with their previous drilling methods. A new speed reducer on this model slows auger rotation for drilling harder rock, resulting in fewer bit failures. A catalogue is available for your inspection. Circle No. 18.

ABRASIVE SLURRY PUMP: A newly developed sand and gravel pump designed to handle abrasive slurry, is now available from the Kansas City Hay Press Co. The pump has only three wearing parts. The new model designated as "Lightning" is rubber lined, and has a stainless steel shaft. Circle No. 19 for further details.

PORTABLE LAB DRYER: The Hardinge Company has issued a bulletin describing their new Ruggles-Coles XB Pilot Plant Dryer. This dryer is a double shell, indirect-fired, rotary dryer, designed especially for laboratory use. It is applicable also for small capacity unit processes requiring a drying step. Circle No. 20 for additional information.

JUST AS GOOD: An interesting new booklet entitled "Just as good . . . ?", which compares parts available from the

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to get further information on any item described in the Production Equipment Preview, note the key number of that item, circle the corresponding number on the PEP card at the right, and mail. If mailed from a point outside the United States, proper postage must be used.

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machine manufacturer to those offered by substitute parts manufacturers who describe their parts as being "just as good" as genuine parts, has recently been announced by Caterpillar Tractor Co. Send for your copy, circle No. 21.

WIRE LINE CORE BARREL shows better results with lower costs. Core recovery is higher and less effort is expended to recover core by eliminating the need for pulling the entire string of drill rods. According to the manufacturer in a recent field operation, elapsed time from start of pulling core to resumption of drilling in a 3000-foot hole was recorded at less than 33 minutes. For the full Wire Line story circle No. 22.

TAILORED PUMPS: Vaceal Pumps, manufactured by the Galigher Company, are tailored to meet all industrial requirements. They can be rubber-lined, hard-iron or special alloy; acid-proof or standard—providing a full range of handling abrasive or corrosive pulps. Circle No. 23 for free bulletin describing pumps.

HARDSURFACING ALLOYS: Coast Metals, Inc., Little Ferry, N Y., has now available literature describing the new line of hardsurfacing alloys. These materials consist of alloy-filled tubes, either in coils for automatic welding, or cut to length for manual application. Circle No. 24 to receive your literature.

NEW GEIGER COUNTER: A new model 2612L portable Geiger counter for uranium prospecting has been announced by the Nuclear Instrument and Chemical Corp. The unit sells for $250, and features a sensitive Geiger probe which may be mounted in the handle of the unit or may be removed for probing purposes. Circle No. 28 for further information.

SPEEDY PENETRATING OIL: Introduction of a fast-acting penetrating oil having properties of lubrication, rust-prevention, and high flash-point, is announced by the House of Laurila, Detroit, Michigan. Known as Bear Penetrating Oil, it is said to loosen rusted and frozen pipes, metal parts, bolts, etc., in a matter of minutes. Circle No. 30 for additional information.

SWAGED HOSE CATALOG: The publication of a new eight-page Swaged Hose Assembly Catalog has been announced by the Weatherhead Company, Fort Wayne, Indiana. The catalog shows the complete line of Weatherhead swaged hose, hose ends, and adapters available from the company. Circle No. 32 for your copy.

LOW-PRICED BLACK LIGHT: Development of a new budget-priced short-wave Mineralight lamp has been announced by Ultra-Violet Products, Inc. The new lamp, trade-marked "NH Mineralight" is priced at $14.75. It is designed to fill the need among mineralogists as a beginning unit. Operating on 110 volt AC current, the short-wave NH will activate 90% of all flourescent minerals. Circle No. 34 for details.

NICKEL-PLATED STEEL: A twelve page technical manual on CF&I Bart lectroclad nickel-plated steel has been made available by The Colorado Fuel & Iron Corporation. The manual presents a technical description of CF&I lectro-clad nickel-plated products covering manufacturing techniques and fabrication procedures, including forming, welding, cleaning, handling, and testing methods. Circle No. 35 for your copy.

TUBELESS TRUCK TIRES: A new "Power Express" tubeless truck tire with a special X-99 tread compound has been announced by the B. F. Goodrich Co. The new tire is built to meet tubeless tire and rim assembly measurement requirements. According to the company a saving of 40 pounds per wheel may be realized. Circle No. 36 for further details.

BARBER-GREENE Company, of Aurora, Illinois, have now available their new catalog on their line of digging, loading, and conveying machines. Another brochure is available on their complete line of belt conveyor idlers. Circle No. 37 for your copies.

MIDGET HOIST: An 11-pound Midget Chain Hoist capable of lifting 250 pounds has been developed by Coffing Hoist Division of Duff-Norton Co. Company spokesmen state that one man can easily lift a load 30 feet in one minute. Circle No. 38 for additional information.

PORTABLE ACID PUMP: A new portable electric acid pump which conveniently and safely transfers acids from open vessels as well as from standard carboys and drums has been announced by the General Scientific Equipment Company, Philadelphia. Circle No. 42.

CONVERSION TABLES: Hardness conversion tables for steels are given on a 2¾-inch by 4¾-inch celluloid card by the International Nickel Co. The tables give approximate relationship between Brinell, DPH(Vickers), Rockwell and Shore Scleroscope hardness values and corresponding tensile strengths of steels. Circle No. 43 for your copy.

35-TON TRUCK CRANE: The Marion Power Shovel Company recently announced the model 43-MR Truck Crane. The 35-ton rubber-mounted unit according to the manufacturer features exceptional performance for many different types of work. Circle No. 44 for further information.

BIN LEVEL INDICATOR: The Bin-Dicator Company of Detroit, Michigan has recently released a catalog with price list describing their bin level indicators, and showing their applications. Circle No. 48 for your copy.

TROLLEY MATERIAL For Every Mine is the title of a new catalog issued by the Elreco Corporation, of Cincinnati. Every type of material needed for complete trolley line repair or installation is listed in this book. Your copy is available by circling No. 49.

IMPACT TYPE PULVERIZERS: Pulva Corporation announces the availability of a new condensed bulletin describing their full line of high speed pulverizers. The Pulvasizer is available in five sizes ranging from ¾ to 75 hp. Circle No. 50 for your copy.

MULTI-V BELTS: A data sheet on its line of Multi-V belts, featuring the Grommet construction exclusive with B. F. Goodrich, has been published by its Industrial Products Division. Send for this complete V-belt catalog. Circle No. 54.

TELESCOPING BUILDING: The Yard-Stor Shelter Company, manufacturer of a unique, portable, sectional metal storage shelter that tilts, telescopes, and slides apart for easy access, announces its new line and a rental plan for emergency and temporary uses to be offered through local crane and fork truck rental services. Circle No. 59 for the full story.

CENTRALIZED LUBRICATION: The Farval Corporation has made available a booklet entitled "Studies in Centralized Lubrication." The folder presents case histories of several users of this type of positive lubrication. Circle No. 60 for your copy.

VIBRATING SCREENS and other mill equipment data are the topic of discussion in a new booklet prepared by the Pioneer Engineering Works. The 20-page booklet describes the complete line of Super Service vibrating screens. Send for your copy. Circle No. 61.

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Aero Service Corp. uses New Airborne Detector

A new Airborne Electromagnetic Detector developed for use by Aero Service Corporation of Philadelphia is currently in use by this company. The electromagnetic system uses a coil of wire to transmit an alternating field which induces a secondary field in a conducting body such as massive sulphides. In the Aero Service system, the transmitter is towed in a bomb at the end of a 500-foot cable. The plane flies about 500 feet above the ground and complete records are taken

of the output of the EM equipment, aircraft altitude, and simultaneously aerial photographs are taken of the ground below. Tests have shown a high sensitivity to sulphide ore and good discrimination against overburden. Circle No. 73 for complete details.

Chiksan Develops a New Series Hydraulic Monitor

Newest development in hydraulicking equipment is a water monitor capable of throwing a 300 foot stream through a 2⅝-inch nozzle-tip at the rate of 2000 gallons per minute. The Chicksan Intelli-Giant MH-4 has hydraulic controls which can be operated safely and accurately with little effort.

The monitor has a horizontal sweep of 270°, and a vertical range of 120°. The unit operates with pressures ranging from 30 to 300 psi. Hydraulic power is derived from water pressure diverted from the horizontal supply line near the intake. This pressure may be adjusted by control valves. Circle No. 68 for further information on the Intelli-Giant.

Investigate The Schramm Crawler-Air Compressor

The Schramm Model 60 Crawler-Air Compressor is revolutionary in design. It is not only a 60-cu. ft. compressor, but a small tractor and a power unit. The Model 60 is a versatile unit that furnishes air for pneumatic tools, and also offers the possibilities of operating many other attachments, as well as the tractor features that lends itself to towing, climbing, and pushing. The crawler also is equipped with a Backfill Blade, and rear winch. Send for illustrative literature. Circle No. 70.

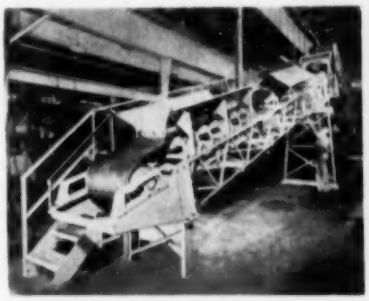
New Swedish Sump Pump Now Available in U. S.

A new line of sump pumps called "Flygt", is now available through Stanco Mfg. & Sales Co., Los Angeles, California. The pumps are fully portable and are efficient under severe conditions of use. They will run "on snore", or when fully submerged they will completely empty sumps. Flygt pumps are designed to pump water containing a high percentage of solids. Self-priming, and frost proof when submerged, they are highly portable and require low maintenance.

The electric powered pumps range in size from 1.5 to 56 hp. Circle No. 71 for further information.

Skookum Company Feature New Series Mining Blocks

The Skookum Co. of Portland, Oregon now has available the new 706 & 708 series mining blocks. According to the company, the design of these blocks were actually determined by mine operators. The blocks include Timken bearings, work-hardened manganese steel sheaves, alloy steel sides and yoke (or hook as required). A roller on the tail hold-pin minimizes wear. A special grip-lock-nut assures against loosening. To prevent undue wear, the guide wheel is reinforced underneath. This prevents the cable from eventually cutting through the wheel. Self-lubricating, the block holds over 1¼-pounds of grease. Circle No. 75 for additional information.

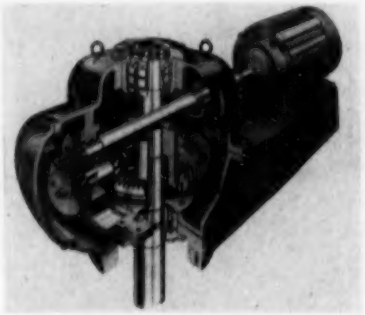


Link-Belt Offers Pre-Bilt Sectional Belt Conveyors

Pre-Bilt sectional belt conveyors in standardized, pre-engineered units in capacities ranging up to 1,500 tons per hour are now available from the Link-Belt Company.

Link-Belt Pre-Bilt conveyors incorporate standard Link-Belt components, including the new Series 50 belt idlers, packaged with sectional truss frames and structural steel supporting bents. They are built in 18, 24, 30, and 36-inch belt widths, with 24 and 42-inch deep trusses. Drives range up to 40 hp.

The conveyors are built in the plant nearest the jobsite, and the components are shop assembled for easy installation. Circle No. 67 for additional information.



Philadelphia Gear Offers A "Packaged" Fluid Agitator

Philadelphia Gear Works now manufactures impellers, shafts, drive supports, all gears, and reducer housings to offer the first completely integrated "packaged" fluid agitator service. An exclusive feature of the new agitator is its low headroom design which offers maximum bearing span with minimum headroom.

The helical change gear set, contained within the housing, allows for ready selection of up to 14 different standard speeds. Large, heavy-duty output shafting results in less shaft deflection at the stuffing box or mechanical seal and steady operation of long overhung agitator shafts. Bulletin A-255 gives complete details. Circle No. 69.

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U.S. Steel Builds Ore Sizing Plant on Mesabi

Construction has started on a large ore-sizing plant at Virginia, Minnesota for the Oliver Iron Mining Division of the United States Steel Corporation. The plant will treat only direct shipping ores produced in Oliver's nearby Auburn, Rouchleau, and Sauntry mines.

In addition to this plant, Oliver will also install and place in operation this year sizing units for the concentrates produced at four of its low-grade ore beneficiation plants. Another large one, similar to the Virginia unit, is now under study for the Hibbing-Chisholm area and construction may be started on that one this year.

The new ore-sizing program, which includes sintering the fine ores at the furnaces, will convert the finely textured Minnesota ores into a more desirable raw material for the blast furnaces. The program supplements Oliver's extensive facilities for treating low-grade ores and taconite. Both programs are intended to increase the adaptability and desirability of Minnesota ores for blast furnace use, provide additional employment, and extend the life of Minnesota's iron ore reserves.

The Virginia plant is expected to be completed and in operation for the 1957 ore shipping season. Western Knapp Engineering Company of Hibbing is working on the foundations and piling after which the corporation's American Bridge Division will supply and erect the structural steel and install the machinery in the new plant.

Calumet & Hecla, Inc. reports that over 7,000,000,000 gallons of water will have been pumped from the *Osceola Lode* when both mines are in full production sometime next fall at Calumet, Michigan. The *No. 13* mine is already unwatered and will go into full production soon. The original goal had been last summer, but the 16-week strike delayed operations. A report on technical aspects of this project was first presented in MINING WORLD, November 1954, pages 38-45.

Illinois produced about 60 percent of United States production of fluorspar in 1955. In the Hardin County district, the *Ozark-Mahoning Company* neared completion of its 800-foot mechanically mucked shaft on the *Hill-Ledford Lease*. The *Minerva Oil Company* purchased the properties of the *Victory Fluorspar Mining Company* on Spar Mountain, northeast of Cave-in-Rock, Illinois, and is modifying it for utilization of Diesel truck haulage and Diesel loaders. It is being connected by a truck haulage drift with Minerva's adjoining *Crystal* property, which has adit openings for trucks on the hillside near the mill. The mill on the Crystal property was enlarged in 1955 for the manufacture of acid grade fluorspar, as well as metallurgical and ceramic grades. *The Mackey-Humm Fluorspar Mining Company*, operating near Humm's Wye, west of Rosiclare, completed an HMS plant early in 1955.

The *A&P Mining Company* is developing newly discovered ore lenses beneath the abandoned *Benzon* workings on Spar Mountain. The *Hobe Mining Company* northeast of the *Goose Creek* mine in the north part of Hardin County is developing a small vein prospect into a producer.

The *American Zinc Institute* and the *Lead Industries Association* will hold joint annual meetings on April 23-25 at the Statler Hotel in St. Louis. Assistant Secretary of the Interior Felix E. Wormser will address a joint session on April 24, where the domestic and world outlook for lead and zinc will be discussed.

Woodward Iron Company has announced an $8,700,000 development program to be carried out this year. The program includes construction of a sintering plant for processing fine iron ore and flue dust which is unsuitable for blast furnace use in its present form; rehabilitation and development of *Longview Lime Corporation* properties located at Saginaw, Alabama which were purchased last year; extension of development of the *Mulga* mine; replacement of power generating equipment; development of iron ore reserves in the Wildwood area, and acquiring of additional mineral research facilities.

Exploration Projects Inc. has reached an agreement with *Virginia Mining Corporation* for the development of copper-lead-zinc properties in the Dillwyn area of Buckingham County, Virginia, 60 miles from Richmond. Exploration Projects will make a geophysical survey and, if warranted, will diamond drill the property. This phase of the program will last until May 1, 1957. If mining is indicated, Exploration Projects will then form an operating company to acquire the property from Virginia Mining for a vendor's interest equivalent to 40 percent. It would be exclusive of the *Hobson*, the *London & Virginia*, and the Manchester tracts also held by Virginia Mining. Exploration Projects is a private exploration and development group organized by *American Metal Company Ltd., Consolidated Coppermines Company*, and other United States firms, along with a Canadian group including *Ventures Ltd., O'Brien Mines Ltd., Wright-Hargreaves, Preston East Dome*, and *Selection Trust*.

From December 31, 1955 to February 3, 1956, the GSA stockpile received 78,339 units of tungsten. This brought the latest audited tungsten purchases to 2,458,314 short ton units as of February 3; delivered but not yet accepted were approximately 130,774 short ton units. Only 541,686 audited units remain to be purchased to complete the program.

The new *Grace* mine of *Bethlehem-Cornwall Corporation*, a division of *Bethlehem Steel Company*, is making steady progress in its development at Morgantown, Pennsylvania. The "A" shaft had reached the end of the present sinking program at a depth of 2,207 feet in mid-January 1956, and "B" shaft reached 2,350 feet before the end of 1955. Two more "A" shaft level stations were completed in 1955—No. 3 and 4 at 2,020 and 2,124 feet, respectively, and a pump station was constructed in "B" shaft at a depth of 1,548 feet. In 1956 it is expected that construction of the mill building, the "A" shaft headframe, and the crushing plants will be well underway. It may be another four years before full production is attained.

A uranium discovery has been reported near Lambertville, New Jersey about 60 miles southwest of New York City. Alvin and Vernon Gatling of South River, New Jersey have staked a 400-acre claim.

All equipment has now been successfully operated at the *Reserve Mining Company's* E. W. Davis Works at Silver Bay Minnesota, and the plant is entering the over-all tune-up stage. Last to be placed in operation was the sixth pelletizing machine. The first pellets were produced on October 21, 1955. As each additional unit of the plant was built, it was put into operation and pellets were stockpiled. The stockpile now contains 560,000 gross tons of pellets which will be shipped by ore carrier when the season opens this spring. Recipients of the pellets are *Armco Steel Corporation* and *Republic Steel Corporation*, joint owners of this $190,000,000 project. Full capacity production will be at a rate of 3,750,000 tons of taconite pellets annually. Additional construction work is scheduled, with plans calling for installation of a new fine crushing line and more conveyor belts.

The *Marquette Iron Mining Company* formed recently by *Cleveland-Cliffs Iron Company* to lease the *Republic* and *Empire* mines (see MINING WORLD, March 1956, page 35) has four other participating members whose identities have now been revealed. These firms are: *Jones & Laughlin Steel Corporation* with a 15 per cent interest in the company; *Wheeling Steel Corporation* with a 10 percent interest; *Inland Steel Company* holding 20 percent; and *International Harvester Company*. Since CCI owns 47½ percent, it can be assumed that International Harvester will have the remaining 7½ percent. Each of the two mines of Marquette will be capable of an ultimate annual output of 1,500,000 tons of concentrates. The pelletizing plants, however, will be built in units of 500,000 tons, with the first to go into production later this year. Other 500,000-ton units are scheduled to be added in 1958, 1961, and 1964.

Major ore producers decided not to go along with the 85¢ increase in prices for 1956 shipments of Mesabi grades of iron ore from Minnesota, announced previously by *Cleveland-Cliffs Iron Company*. (See MINING WORLD, February 1956, page 95.) *Oliver Iron Mining Division* of the *United States Steel Corporation* notified its customers of a 75¢ increase and others followed suit. The prices set recently are as follows: Mesabi Non-Bessemer $10.85 per gross ton; Mesabi Bessemer $11.00. Old Range ores from the Michigan mines remain the same.

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COLORADO

The DMEA has granted a $107,220 contract to the *American Smelting and Refining Company* for exploration of lead-zinc-copper in Gunnison County, Colorado. The government's share of this contract is $53,610.

The *Colorado School of Mines* at Golden, Colorado will sponsor a Symposium on Rock Mechanics April 23-25. Such subjects as rock failure, design and support of underground openings, mining by block caving, and rock fragmentation by blasting will be discussed. Speakers include C. W. Livingston; Dr. Leonard Obert of the U.S. Bureau of Mines; Dr. John J. Reed, head of mining research department, St. Joseph Lead Company; Dr. H. K. van Poolen, Halliburton Oil Well Cementing Company; Prof. Philip B. Bucky of Columbia University; Dr. Kumao Hino, chief of explosives research, Nippon Kayaku Company, Japan; Dr. F. W. Brown, director of the National Bureau of Standards Laboratory at Golden; and Dr. C. H. Noren of DuPont Research Laboratories, Wilmington, Delaware. There will be a field trip to *Climax Molybdenum Company's* operations.

The *Bradley* mine near Telluride, Colorado has been sold to *Utaco Uranium, Inc.* by the *Mt. Wilson Mining Company*. The mine was first opened in 1904 and is primarily a lead and zinc producer. The new owners plan production as soon as weather permits, and are currently considering the erection of a small mill.

Central Eureka Corporation of San Jose, California has entered into a contract to acquire all of the capital stock of *Flanders Mining Company* whose principal offices are in Grand Junction, Colorado. Flanders owns property on the Colorado Plateau, as well as in Idaho, Wyoming, and New Mexico. Central Eureka has also entered into a contract to purchase *Balboa Mining and Development Company* which owns property adjoining the Hidden Splendor mine in Utah.

The Defense Minerals Exploration Administration has granted a $19,228 contract to the *Bowles-Heflin Mining Company* to explore for uranium in San Miguel County, Colorado. The government's share in the project is $14,421.

SOUTH DAKOTA

The *Chicago North Shore System, Inc.* has purchased the capital stock of *Mines Development Inc.* of Edgemont, South Dakota through one of the railroad's subsidiaries—*Ramoco* of Racine, Wisconsin. Mines Development is presently building a $2,000,000 uranium processing plant under contract with the United States Atomic Energy Commission. No price has been revealed for the Ramoco purchase, but Chicago North Shore is said to have indicated it expected the total investment in the project to reach $2,500,000.

UTAH

Continental Uranium, Inc.'s metallurgists have been working with the engineering firm of *F. C. Braun & Company* of Alhambra, California, and the latest improvements will be incorporated in the new uranium mill Continental is building at La Sal, Utah. (See MINING WORLD, January 1956, page 61.) The company has also obtained from Joe Redd of La Sal an option on water rights for the milling operations. At the *Continental No. 1* mine, operations have been resumed by Continental after installing its own crew. The property had been worked by *Minerals Engineering Company* under contract.

A uranium ore channel 740 feet long, 50 feet wide, and from 1 to 3 feet thick has been indicated by drilling at the *Deadhorse Point* claims near Moab, San Juan County, Utah. It is a joint venture of *Nabob Silver-Lead Mining Company, Merger Mines,* and *Bismarck Mining Company* of northern Idaho's Coeur d'Alene mining region. A development tunnel is being driven just beneath the ore zone and a shipping contract has been negotiated with the United States Atomic Energy Commission. Walter Campbell is directing the work. Dr. Warren Wagner is consulting geologist.

Homestake Mining Company's two uranium subsidiaries—*Little Beaver Mining Company* and *La Sal Mining Company*—reported a profit for 1955 of $449,000. To date, Homestake has expended about $2,363,000 in the acquisition and development of uranium properties on the Colorado Plateau, and $1,934,000 or 82 percent of the expenditure has been repaid. It is significant that practically all the production was from development work. Regular stoping operations now underway should considerably increase the output this year.

According to "Petroleum Information," *New-Shat-Tex Corporation* has picked up the option on the *Happy Jack* mine in the White Canyon district of Utah. The property was placed on sale last November by the owners—Joe Copper, and Fletcher and Grant Bronson of Monticello. *Barlu Oil Company* of Dallas secured the option, then transferred it to *National Mining & Milling Company*. The latter cancelled the option in mid-January. New-Shat-Tex is a joint operation of *New Jersey Zinc Company, Shattuck Denn Mining Company,* and *The Texas Company*.

Bear Creek Mining Company, exploration subsidiary of *Kennecott Copper Corporation*, is said to be negotiating with *Chief Consolidated Mining Company* and *Tintic Standard Mining Company* over exploration of properties in the East Tintic district of Utah. The areas involved are reported to be all of Tintic's holdings and about 3,000 acres of Chief Consolidated's property. None of Chief Consolidated's present operating properties would be involved and no sale of properties or companies is involved. The exploration project is for

Steel Work Rushed at Moab Reduction Mill

Uranium Reduction Company's $8,000,000 uranium processing mill at Moab, Utah is moving rapidly ahead toward completion. The aerial photograph above shows the project as it was on February 20th; it is scheduled for operation by the middle of this summer. The crushing plant will be located in the area at the left in the picture above; 10, circular, steel, ore storage bins and various leaching plants are in the center; while the office and warehouse facilities are at the right. Foley Uranium Constructors, a subsidiary of Foley Brothers, is general contractor. Western Steel Company of Salt Lake City and Hammond Iron Works of Provo are among the prime sub-contractors. J. Wesley Burgess is general manager of construction for Uranium Reduction, and S. E. Worthen who took the picture is project engineer. Uranium Reduction was organized by Charles Steen, discoverer of the famous Mi Vida mine and president of Utex Exploration Company, and Edward H. Snyder, president of Combined Metals Reduction Company. Mr. Snyder is chairman of the board of the new company, and Mitchell Melich is president. American Zinc, Lead and Smelting Company will manage the plant under the direction of Richard A. Young, vice president of American Zinc.

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nonferrous metals. Bear Creek is currently drilling on the *Jenny Lind* unit in the Eureka-Tintic district.

Uranium-bearing channels 320 feet and 200 feet in width have been proven by 4,933 feet of diamond drilling at the Colorado River mine in San Juan County's Hatch Point area of Utah. Mineable ore is believed to extend over a length of at least 300 feet along the widest channel. More drilling is scheduled to determine the true length. Development of the channels then will be undertaken by extending existing tunnels. The 46-claim property is being operated by *Sidney Mining Company* and *Mascot Mines, Inc.* of Kellogg, Idaho, under lease from *Colorado River Uranium Mines.*

WYOMING

The *Lost Creek Oil & Uranium Company* of Rawlings, Wyoming has announced it will submit a milling contract proposal to the United States Atomic Energy Commission for construction and operation of a uranium mill at Riverton, Wyoming. Amenability tests have been made on Lost Creek ore by *Colorado School of Mines Research Foundation,* which also designed a flowsheet and computed estimated milling costs. Western-Knapp Engineering Company of San Francisco, is drawing preliminary plant designs for a 400-ton mill. Lost Creek reports it has 88,000 tons of 0.25 percent U_3O_8 ore blocked out on its property in Crooks Gap area of central Wyoming, and also has ore assignments with other producers.

War Bonnet Uranium Corporation of Lander, Wyoming has started open-pit mining on a uranium outcrop and further test drilling on company property on Beaver Creek, 25 miles southeast of Lander.

The *Bice Mining Company* of Billings, Montana recently delivered a truck load of uranium ore from its property in the Pryor Mountain area along the Wyoming-Montana line to the buying station at Riverton, Wyoming. The ore assayed 1.0 percent U_3O_8.

At a meeting of industry representatives, a committee was appointed at Riverton, Wyoming, in January to draw up a constitution and bylaws for a *Wyoming Mining Association.* The committee is consulting the Colorado and Utah mining associations for assistance.

A peremptory writ of mandamus by District Judge G. A. Layman at Sheridan has nullified two principal regulations of the Pumpkin Buttes mining district, Wyoming, which was formed shortly before the area formerly withdrawn by the U. S. Atomic Energy Commission was re-opened for mineral entry Nov. 17, 1955. The judge ordered the district recorder to accept for recordation mining claim location notices even though they fail to contain assignments of 5 percent royalty and 12½ percent of proceeds of all future sales to owners of surface rights, as stipulated by district regulations. The writ was obtained by Bud Blonder of Lander, Wyoming. At latest report the district was attempting to get the writ cancelled, planning an appeal to the Supreme Court if necessary.

Fort Worth Firm Awarded Uranium Coring Contract

A $250,000 contract for uranium prospecting has been awarded to Southern Geophysical Company of Fort Worth, Texas and coring operations have started on property held by New-Shat-Tex Corporation in the Four Corners area of Utah, Colorado, New Mexico, and Arizona. A Southern Geophysical camp for operating personnel has been established on location, approximately 150 miles northeast of Flagstaff, Arizona.

The contract with New-Shat-Tex calls for drilling 174,000 feet of core holes, each hole not to exceed 300-foot depth. Seismic shot-hole rotary drills will be used in the uranium exploration program.

New-Shat-Tex Corporation, with headquarters at Grand Junction, Colorado, is an exploration company owned jointly by the New Jersey Zinc Company, Shattuck-Denn Mining Corporation, and The Texas Company.

Court Dispute Closes Open-Pit Chrome Producer

Litigation has closed the Mistake mine in southwestern Fresno County, California, the largest single open-pit producer of metallurgical grade chrome in the United States.

Principal issue in the dispute is location of a township line between the mineral lease for Mistake held by J. R. Holman of Pasadena who is the mine operator, and patented agricultural land owned by the estate of the late Aaron Burr Butler. The action was initiated in April 1955 when attorneys for the estate threatened suit on strength of the heirs' claim that a portion of the mine was on Butler property. The estate was awarded the mine area, and this is now being appealed before the District Court of Appeals in the Fourth Appellate district of California.

The "Mistake" mine was opened for volume production in March 1953 by Mr. Holman, under lease from Jack and Lavonna James, and Andrew J. and Alta Mae Thickstun, all of Coalinga, California. The mine is located on Rucker Ridge about 28 miles northwest of Coalinga, in the Diablo range. It was so named after it was found that only a placer claim had been filed, which covers scattered or disseminated ore, but would not protect the owners if a lode deposit were found. This "mistake" was corrected when a lode claim was filed after operations were well under way, and the mine was called the "Mistake."

White Canyon Mining Company has sold its manganese properties in the Artillery Peaks district of western Arizona to *World Manganese Corporation*, a wholly owned subsidiary of *World Church*, for $575,000. Payments will be made over the next 13 months. White Canyon is reported to have purchased the property originally for $125,000, and to have spent another $125,000 in equipment.

Uranium prospecting rights over 550 acres of the Navajo Indian Reservation have been acquired by *Newmont Exploration Company* in Arizona.

The *Siskon Corporation* hopes to have its newly installed ball mill in operation this spring at its gold and silver property on the south fork of Dillon Creek in Siskiyou County, California. This will permit the firm to increase daily mill tonnage to 150 tons per day.

Operations at the 100-ton Toy tungsten mill 15 miles west of Lovelock, Nevada are progressing rapidly. Some construction work is still going on but milling has also been started. Scheelite ore is coming from the *St. Anthony* tungsten mine, 20 miles west of Lovelock, and will also come from the *Starlight* mine near Imlay; at present the latter ore is being stockpiled. At the mill the ore is crushed and screened into fines; then passed over six concentration tables to produce 40 percent concentrates. This concentrate is then upgraded to 62 percent.

Nevada Scheelite Corporation, a wholly owned subsidiary of *Kennametal, Inc.*, has completed sinking of a three-compartment shaft to a depth of 400 feet in Mineral County, Nevada. From this level a winze has been extended to the 500 level and is now being deepened to the 600 level. Mill recovery reportedly averages one unit (1.0 percent) of tungsten per ton of ore milled, and this grade seems to be maintained on the 500 level. Because of the character of the country rock, the square set system of mining is used. In addition to milling crude ore, the company also has a 150-ton mill for processing of tailings, resulting from a prior operation at Dead Horse Wells, about nine miles from the mine. The tailings are reground in a Marcy mill and then floated. The concentrates are then hauled to the milling plant at the mine site for upgrading in an acid plant.

The *Eagle-Picher Company's* diatomaceous earth project near Lovelock, Nevada has come to a temporary standstill because the U.S. Bureau of Land Management has not yet decided whether to take control of the land for a proposed naval gunnery site. Until the decision is made, Eagle-Picher cannot proceed with work on a processing and shipping plant near Lovelock. Meanwhile, the company is still studying the samplings made during a geological program last year.

Dursan Mining Company will reactivate the *Stauber* mine in Guadalupe County, New Mexico, 13 miles southwest of Santa Rosa. The property has produced silicious copper ore in the past.

Kerr-McGee Oil Industries' Navajo Uranium Division is completing its third expansion of its Shiprock, New Mexico uranium mill. It has also been conducting an extensive core drilling program to establish ore reserves in McKinley County, New Mexico.

Lone Star Mercury Modifies Furnacing Plant

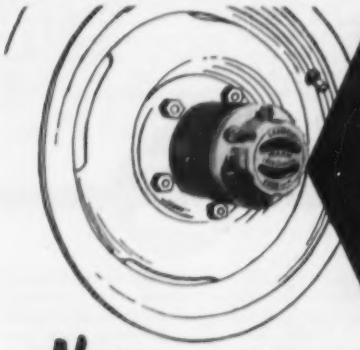
Lone Star Mercury, Inc. has been furnacing high-grade mercury ore in its 35-ton modified Gould recovery plant at its Maggie mine in the Terlingua, Brewster County, Texas mercury district. The photograph above shows the furnacing plant built on the hillside below the Maggie mine waste dump. The rich ore recently furnaced was mined on the Louisa claim, about one mile away, and trucked to the plant. The first ore was mined through a crude shaft (see September 1955, Mining World, page 108), but an adit has been started down the hillside from the shaft collar to cut the ore zone. The ore discovery and plant rehabilitation were directed by Roy Brown of Santa Rosa, California. Principal owners of Lone Star are Skubic Brothers, iron ore beneficiation plant owners of Virginia, Minnesota, and H. P. Reynolds, a Chicago, Illinois attorney.

The *Petaca Mining Corporation* made its first shipment of fine ground mica to Texas in February, and plans another 20-ton shipment to California. The company's million-dollar mill at Petaca, New Mexico is operating 8 hours a day and will go to 16 hours in the near future, officials said.

The county clerk of Valencia County, New Mexico reports there has been a large increase in filing of mining claims in the past few months. On a single day in mid-February more than 300 claims were filed—mostly for uranium in the districts of Grants, Mount Taylor, and Zuni.

The *United States Smelting, Refining and Mining Company*, who recently announced plans to reopen the *Bayard* lead-zinc mine and mill in New Mexico, now reveals that leases have been granted to the following operators: Ray Holmquist of *Vermillion Cliff Mining Corporation* of Arizona; Patton and Galassini of Silver City, New Mexico; and McFarland and Hullinger of Nevada.

Seaboard Oil and Gas Company of Wichita Falls, Texas has acquired the *Socorro Uranium Corporation* of New Mexico and the *Equitable Uranium Corporation* of Colorado as wholly owned subsidiaries. Among the properties held by Socorro is the *Jeter* uranium mine in the Ladrone mining district of Socorro County. Core drilling has been in progress there for some time by C. C. Sterns and Associates of Grand Junction.



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TEXAS

Reynolds Metals Company plans to increase alumina production capacity from 1,000 tons to 1,500 tons daily at La Quinta, Texas. The 50 percent expansion will cost between $25,000,000 and $30,000,000. This will include extension of a pier adjacent to the plant, expansion of bauxite storage facilities, and dredging of a channel to permit bauxite ore carriers to approach the pier. The expansion is said to be necessary to supply requirements of the new plant being built at Listerhill, Alabama. The latter will add a planned 200,000,000 pounds to Reynolds' aluminum capacity bringing it to 1,000,000,000 pounds. More than 640,000,000 pounds of primary aluminum has been contracted for by *Ford Motor Company* within the next 10 years.

Continental Oil Company has completed about 10,000 feet of exploratory drilling in Karnes County, Texas, and is now blocking out ore. Assays reportedly show it to contain from 0.20 to 0.30 percent uranium oxide; according to "Petroleum Information," the ore is apparently a mixture of samarskite and euxenite. Spectographic analyses indicate that it is a combination of uranium and rare earths.

The *National Oil and Uranium Exposition* will be held at the Texas State Fair Grounds in Dallas on May 10 through 13.

Big Bend Mining Inc. has been granted a DMEA loan to explore for mercury and uranium in Presidio County, Texas. The contract value is $132,000, with the government's share totaling $99,000.

The *Southwest Research Institute* will sponsor a two-day conference in cooperation with the *Atomic Industrial Forum* which is intended to alert business and commercial leaders in the Southwest and Mexico to the significance of atomic energy. The conference will be held in San Antonio, Texas on May 10 and 11. One panel will outline the preparation of fissionable materials from the mined ore through the various processing stages. Additional information may be obtained from C. W. Smith, Southwest Research Institute, 8500 Culebra Road, San Antonio, Texas.

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Pacific Northwest Mining and Metallurgical Engineers Will Meet in Seattle, May 3, 4, & 5

The annual AIME (American Institute of Mining, Metallurgical and Petroleum Engineers) Pacific Northwest Regional Metals and Minerals Conference will be held this year in Seattle, Washington at the Olympic Hotel on May 3, 4, and 5.

Men from all over the western United States and Canada will meet to hear technical papers by leaders of research and industry, among whom will be Grover J. Holt, AIME president-elect, and general manager of the Ore Mining Department of the Cleveland-Cliffs Iron Company, Ishpeming, Michigan. Mr. Holt will speak at the banquet on Friday evening, May 4. At the Mining Branch luncheon the same day, the speaker will be Dr. Desmond F. Kidd, past president of the Canadian Institute of Mining and Metallurgy. Dr. Kidd, a well-known mining geologist in western Canada, is a director or officer of several Canadian mining companies, as well as consulting geologist for the British Columbia Power Commission. The Metals Branch luncheon on Thursday will be addressed by Dr. J. Gordon Parr, associate professor of metallurgy from the University of Alberta at Edmonton, Alberta.

Conference general chairman, E. R. Marble, recently retired manager of the Tacoma smelter of the American Smelting and Refining Company, has had the help of J. G. Johnston, chief metallurgist, Bethlehem Pacific Coast Steel Corporation of Seattle, in arranging the Metals Branch program and of W. C. Douglass, vice president, Kelowna Mines-Hedley Ltd. of Seattle, in arranging the program of the Mining Branch.

Grover J. Holt

Among the many interesting papers to be presented, the following subjects will be discussed: Underground Transportation at the Pend Oreille Mine, Rock Bolting in Metal Mines, Sunshine Milling Practice, A Review of Uranium Milling Practice To Date, Factors Influencing the Selective Flotation of Complex Lead-Zinc Ores, Localization of Ore in the Kootenay Arc, The Work of the U.S. Geological Survey in the Pacific Northwest, Production of Phosphoric Acid and High-Analysis Phosphate Fertilizers from Western Phosphate Rock, Cominco's New Sinter Plant, and Ore and Concentrate Handling and Bedding at the Tacoma Smelter.

MONTANA

More than 450 uranium claims have been filed on tracts in the Pryor Mountain area about 45 miles south of Billings, Montana since the discovery of extensive calcium-uranium-vanadium-oxide minerals including tyuyamunite. Among the claim holders are William E. Coyle, Walter B. Dean, Jr., and Glen E. Ferguson who operate the *Swamp Frog* claims; and Homer, Herman, and George Guay Corwin Rule, and Ben Helgeland who operate the *Old Glory* claim as the *Pryor Mining Company*.

Little Hawk Mining Company of Dillon, Montana is reported to be concentrating tungsten ores from its open-pit mine near Dillon.

A new gold-silver-lead ore body has been found in the old *Morning Glory* mine near Troy, northwestern Montana. It was intersected unexpectedly in extending No. 6 level toward ore found in down-hole diamond drilling from the No. 4 level. At last report, the tunnel had been in ore about 100 feet. Plans called for continuing on to the main objective and then opening the ore shoots on the No. 8 level. A 100-ton mill on the property would be enlarged if results justify. Work is being done by *New Morning Glory Mining Company*, organized by John H. Stevenson and Associates of Seattle, Washington, who purchased assets of the old Morning Glory last fall from C. W. Thornton of Troy.

An open-pit copper mining operation is planned by *U & W Uranium, Inc.*, of Spokane, Washington on 12 claims leased from Mathew L. Whaley 12 miles south of Missoula. Thomas J. Linton, Spokane, is president.

The *George A. Relyea* phosphate mine 11 miles north of Garrison, Montana was active throughout last year. Production totaled 35,000 tons of phosphate rock, 5,000 tons of which was sold locally and the remainder exported. The operation employs 14 men including eight contract miners. In addition there are six lessees.

The *U.S. Department of the Interior* has released a report on the analyses of diamond drill core samples and logs of holes drilled by the *Bureau of Mines* while exploring for additional reserves of manganese ore in the Philipsburg district, Granite County, Montana. The Bureau investigated the district in cooperation with the *United States Geological Survey*. Holes totaling more than 6,000 feet were drilled from nine surface and eight underground sites. A copy of Report of Investigations 5173 may be obtained from the Bureau's Publications Distribution Section, 4800 Forbes St., Pittsburgh, Pa.

Development at the *St. Paul* lead-zinc property near Libby, Montana is expected to be resumed as soon as winter subsides. Before snow and cold halted work, an estimated 4,000 tons of ore had been blocked out and 300 tons stockpiled. Ore developed will yield an estimated $150,000 after mining, hauling and milling charges. *Silver Star Mines, Inc.*, Wallace, Idaho, and *Oro Mining Syndicate*, Kellogg, Idaho, are partners in the development.

Recent new incorporations in Montana includes the following: *Corbin-Wickes Mining Corporation*, Great Falls, A. K. Burnes, R. W. Gabriel and A. K. Anderson, all Great Falls; *Niki Mining Company*, Bozeman, John G. Buttleman, Three Forks, and Donald L. Puckett and F. E. Huff, Billings; *Northern Milling Company*, Zortman, Loren Anderson et al, Bismarck, N. D.; *Strategic Metals Company*, Butte, Edward B. Fralich and Francis A. McKinney, Butte, and John Burch, Spokane; *P. E. C. Inc.*, Plentywood, A. H. Moeller, Fay and Britt Chadler, Harold DeSilva and R. L. Johnson; *Colomont Mining Enterprises, Inc.*, Great Falls, John Warren and John H. Moe, both Great Falls, and Lee Adams, Billings; *Texmont Mining Corporation*, Stanford, William R. Harner, Roland L. Westerman and Lora D. Westerman, Monarch; *Pryor Mining Company*, Billings, Ben Helgeland, R. C. Rule and Vinita P. Rule, Pryor, and George E., Homer Jr., and Harvey Guay and Leo Eres, Billings; *Modia Uranium Exploration Corporation*, Dillon; *Squaw Creek Mining Company*, William J. Walker, Jack L. Green, J. P. Lanham, Ernest C. Ecklesdafer and Robert Bandy, all Missoula.

Laurence Beery, lessee of the *Polaris* mine west of Dillon, Montana, has entered into a partnership with Lee M. James of Dillon to operate the Beaverhead County property.

IDAHO

Sinking operations are scheduled in the *Silver Syndicate* mine, Shoshone County, Idaho, to get more depth on ore bodies mined above the bottom 3,840-foot level. The mine is being developed by *Sunshine Mining Company* under a profit-sharing arrangement.

Day Mines, Inc. has virtually completed rehabilitation of the main shaft at the old *Gold Hunter* mine near Mullan, Shoshone County, Idaho. The shaft has been unwatered and repaired down to the bottom 1,200-foot level. An extensive exploration program is planned following rehabilitation of the 1200 level workings.

Conjecture Mines, Inc. is planning to double its output of lead-silver-zinc ore at the old *Conjecture* mine near Lakeview, Idaho at the south end of Lake Pend Oreille, by June 1. The goal is 150 tons daily. Plans include enlarging the present 1½-compartment shaft to 2½ compartments and deepening the shaft 200 feet to open a new 700-foot level. Don Majer of Spokane, Washington is president and Lyle Funnell of Spokane is secretary-treasurer.

Elliott Mining Company of Big Creek, Idaho, has been incorporated by Mr. and Mrs. C. E. Elliott of Big Creek; C. W. Mason of Big Creek and Tacoma, Washington; and Alfred A. Grau of Tacoma. The firm is presently developing a copper prospect at Big Creek where a 130-foot tunnel was driven during the past season.

The *Anaconda Company* plans to cease its underground mining operations at Conda, Idaho this month, but will continue surface mining of the phosphate rock. Some of the employees will be

transferred to other Conda operations, while others will be moved to the Butte, Montana properties if they so desire.

Lookout Mountain Mining and Milling Company is planning to resume exploration work at its lead property in the Pine Creek district of the Coeur d'Alene mining region, Shoshone County, Idaho. Directors are Harry Alway, Wayne A. Brainard, and Wendell R. Brainard, all of Kellogg.

Black sands of Valley County, Idaho, formerly dredged for monazite, may prove more valuable as a source of titanium, pig iron, manganese, and columbium. A high-grade titanium slag and a marketable pig iron have been obtained from ilmenite concentrates recovered from the sands. The recoveries were made in electric smelting tests at the Albany, Oregon laboratory of the *United States Bureau of Mines*.

R-G Mining Company has been formed by Ray P. Klepinger, James Towler, and Ewing Little of Kellogg, Idaho, with $350,000 capitalization.

Dawn Uranium and Oil Company has started open-pit mining of autunite on the *Smith* lease in the Mount Spokane district under a 50-50 profit-sharing agreement with *Target Uranium Company*. Six of 10 holes drilled by Dawn indicated commercial ore from near the surface to depths up to 60 feet. Four of 20 holes on Dawn's adjacent *Curtin* lease were said to have indicated commercial ore. More drilling is planned on the Curtin lease. C. Ross Echlin is Dawn secretary-treasurer and Virgil Chamberlain of Great Falls, Montana is geologist.

North Star Uranium, Inc. is planning extensive exploration of uranium showings on its holdings in northeastern Washington. The firm has permits on 480 acres in the Spokane Indian Reservation, southwestern Stevens County; mining claims in Stevens and Pend Oreille Counties; and leases in the Mount Spokane district, northern Spokane County. Ron C. McKelvie, formerly of Calgary, Alberta, is president. William Wuest, Calgary, is company geologist.

Carbon Uranium & Mining Company, Spokane firm organized last July, has entered into an agreement with *Sidney Mining Company* and *Mascot Mines, Inc.*, of Kellogg, Idaho, for exploration and development of 1,400 acres in the Mount Spokane district of Washington. The Idaho firms also have first refusal rights on 6,600 other Carbon acres in northeastern Washington. Initial work will consist of bulldozer trenching of autunite showings disclosed by Carbon Uranium in three shallow pits near Mount Spokane. Albert J. Ellern is president of Carbon and C. E. Spencer, secretary-treasurer.

Kromona Mines Corporation expects to have its 100-ton concentrator operating at capacity soon on ore developed during 1955 at the *Kromona* mine in Snohomish County, Washington's Sultan Basin. Shipments of concentrates made from development ore have run between 20 and 24 percent copper and averaged 1.68 ounces of gold and 3.66 ounces of silver to the ton. Twenty men currently are employed. Joe F. Krom, Seattle, is president.

Dahl Uranium Mine, Inc., has shifted its principal exploration from the Mount Spokane district in northern Spokane County to the Spokane Indian Reservation in southwestern Stevens County. It has acquired prospecting permits on 4500 acres of tribal land. At last report, wagon drilling had been started on a 600-acre tract just south of the Midnite discovery mine. Ore was found in the first deep drill test made on section 13, while only shallow mineralization was found in several shallow holes. Additional holes should give a clearer picture of the situation.

Grandview Mines has added to its holdings in the Jim Creek lead-zinc area of Pend Oreille County, Washington by entering into a lease and development agreement with *Jim Creek Mining Company*. The Spokane firm is planning additional prospecting for uranium this year on state leases just north of the Spokane Indian Reservation in southwestern Stevens County. Karl W. Jasper, Spokane, is president.

Daybreak Uranium, Inc. of Opportunity, Washington at last report ranked as the third largest uranium shipper outside the Colorado Plateau. In its first 11 months of operations in the Mount Spokane area, it shipped 88 freight cars of autunite to Salt Lake City. Winter operations were hampered by severe weather conditions. The weather also caused temporary suspension of diamond drilling at the firm's uraninite prospect in the

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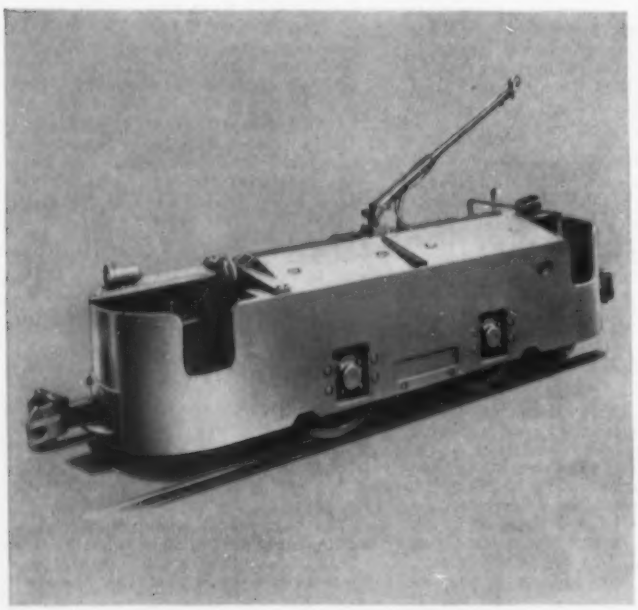

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Spokane Indian Reservation, southwestern Stevens County. Kae H. Sowers is secretary-treasurer.

American Strategic Minerals Corporation has applied for a freight rate of $14.65 a ton to ship uranium ore from Nighthawk, a station near Oroville, Okanogan County, Washington, to Salt Lake City for processing. It also asked rates of $4.00 to Wenatchee and $5.00 to Spokane, possible sites for future uranium ore buying or milling facilities. Operations of the firm's uranium property at Oroville are said to be contingent upon a low freight rate and an AEC contract. Walter S. Price of Seattle is president.

Specimens of a black mineral tentatively identified as uraninite have been found in the Mount Spokane autunite district, northern Spokane County, by W. A. and E. N. Johnson, and W. R. Keimig of Spokane, partners in *Viking Excavator Company*. The mineral was found at a depth of two feet in a micaceous pegmatite. It occurred in stringers up to ¼-inch wide and as nests in muscovite mica. The showing will be test drilled.

Northwest Refining and Chemical Company is preparing to start manufacture of zinc oxide and ammonium sulphate at a new plant in the Spokane Valley, using zinc ores from Stevens County, Washington, and the Coeur d'Alene mining region of northern Idaho. Bernard Wilcox is president.

The old *Lone Star* copper mine north of Curlew, Ferry County, Washington, near the Canadian boundary, is being diamond drilled by *Granby Consolidated Mining, Smelting and Power Co., Ltd.* The firm plans to construct a milling plant if sufficient ore is found to justify it.

An initial shipment of 36 tons of chromite was made from a deposit between Omak and Conconully, Okanogan County, Washington, to the ore purchasing depot at Grants Pass, Oregon. *Chrome Cliff Mines, Inc.* has been organized to develop the deposit discovered by James Dow of Conconully. Fred W. Wagener, Jr. of Prosser is president, and Thomas L. West of Spokane is secretary-treasurer.

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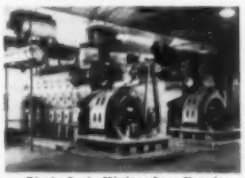

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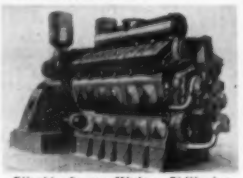

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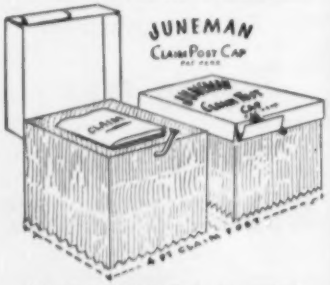

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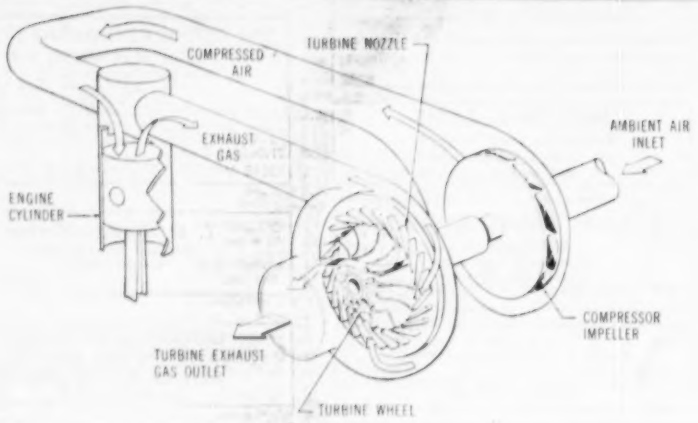

The Cat D397 Turbocharged Engine

Both the D397 and the D375 are also available as *roots blown, naturally aspirated or spark ignited* engines.

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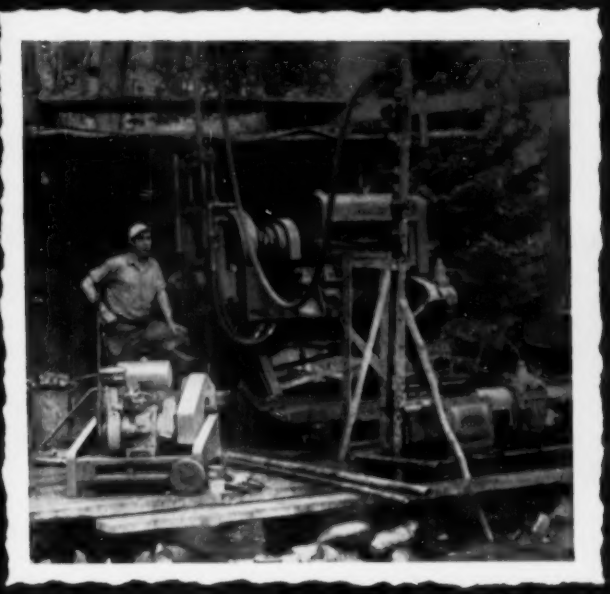

Longyear's Wire Line Core Barrel lets driller concentrate on good drilling techniques

Wire Line Core Barrel Shows *Better Results . . . Lower Costs*

Drill Runners Report 95% Core Recovery—No Back-Breaking Effort! How? By eliminating the need for pulling the entire string of drill rods. Longyear's Wire Line Core Barrel is out-performing conventional equipment, giving more footage per shift with less effort. Result: LOW COST! A recent field report disclosed only *one round trip* for the drill rods to obtain a hundred feet of coring at ten foot intervals. Ten round trips would have been required with conventional equipment. Another company reporting on Wire Line Core Barrel performance at depths of more than 4000 feet reported *saving 50 shifts—faster progress—better core recovery.*

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Write for Bulletin No. 201

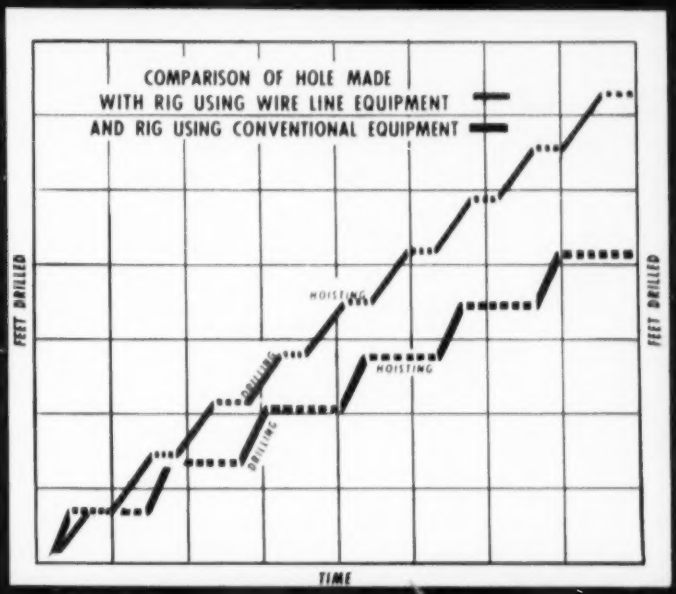

Chart shows advantages over conventional equipment which accrue in both SHALLOW and DEEP hole drilling

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